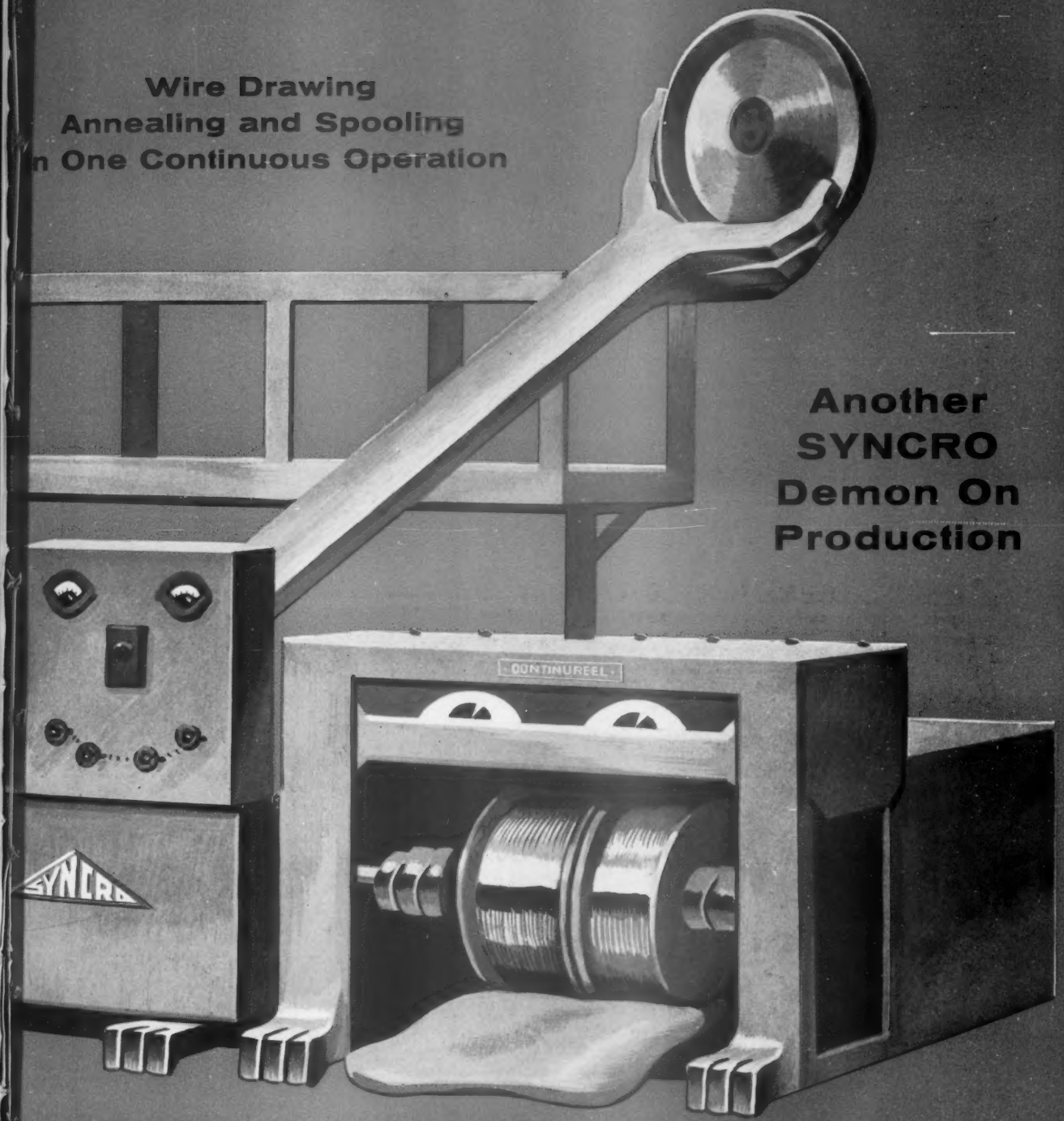
WIRE AND WIRE PRODUCTS

FEBRUARY 1959

Wire Drawing
Annealing and Spooling
n One Continuous Operation

Another
SYNCRO
Demon On
Production

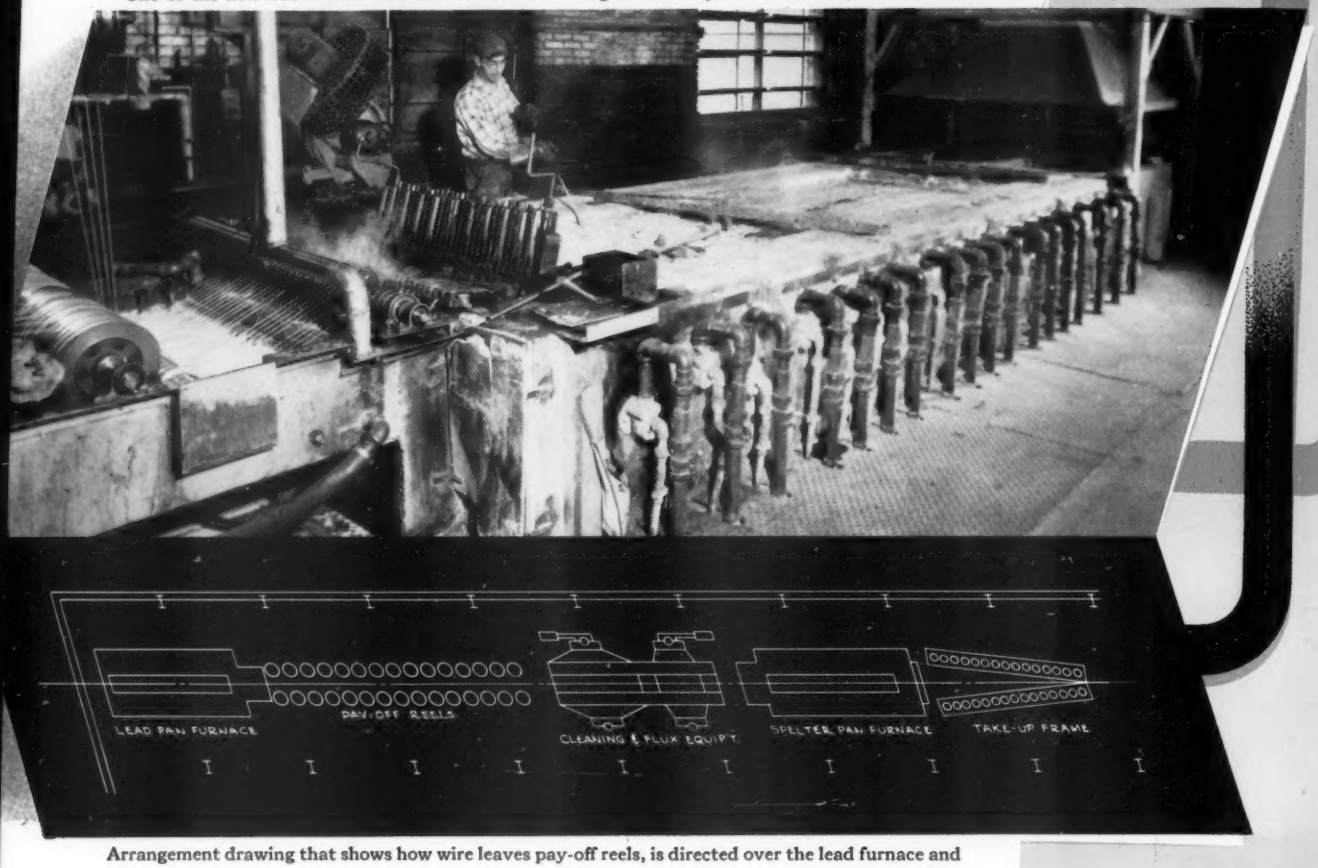


YNCRO MACHINE COMPANY Perth Amboy, New Jersey, USA

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

Lee Wilson RADIANT TUBE
Lead Annealing and Galvanizing Lines

One of the new Lee Wilson Radiant Tube Galvanizing Lines in operation at Colorado Fuel and Iron's Pueblo plant.



Arrangement drawing that shows how wire leaves pay-off reels, is directed over the lead furnace and back through the furnace, over the pay-off reels, where it cools sufficiently to enter rinse and flux and on into the zinc furnace.

doubles pot life—cuts drossage in half!

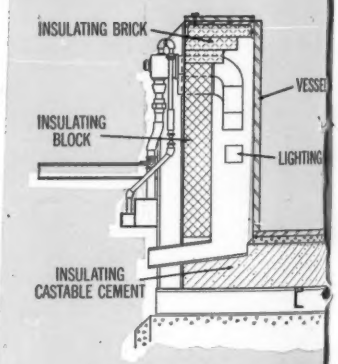
By adapting the radiant tube to lead and spelter pots, Lee Wilson engineers can greatly extend the life of this expensive equipment. And, because the radiant tube method keeps temperatures uniform throughout the pot, eliminating hot spots, drossage is reduced to a minimum. This adds up to better galvanizing, lower maintenance costs and greatly reduced line downtime.

If you are considering wire galvanizing with lead annealing, you should know about this vastly improved method. You can get the answers from your Lee Wilson representative or by writing direct.

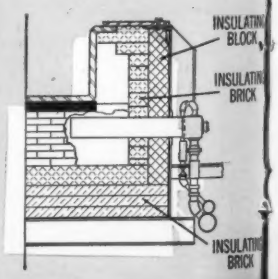
Lee Wilson * ENGINEERING COMPANY, INC.
20005 LAKE ROAD • CLEVELAND 16, OHIO

HIGH CONVECTION ANNEALING FURNACES
MAKE THE BEST METALS BETTER

*ORIGINATORS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES



Burner assembly for zinc furnace



Burner assembly for lead furnace

"America's Finest Wire Draw"

ANNOUNCES ANOTHER GREAT NEW LUBRICANT!!!

Number 937

No. 937 is a complex high-titre soap.

No. 937 does not require any special die practices.

No. 937 produces a tough, dense, uniform coating.

No. 937 is completely adaptable for Rods or Wire, either lime, Stancoat "L", or borax coated.

No. 937 is being used successfully for High and Low Carbon Wire drawing, including special finishes; e.g., spring wire of all types at finishing speeds above average.

No. 937 is a mill-tested and approved lubricant.

"Look to Standard for the Future"

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

Cordially yours,

Standard Industrial

COMPOUNDS CO., INC.

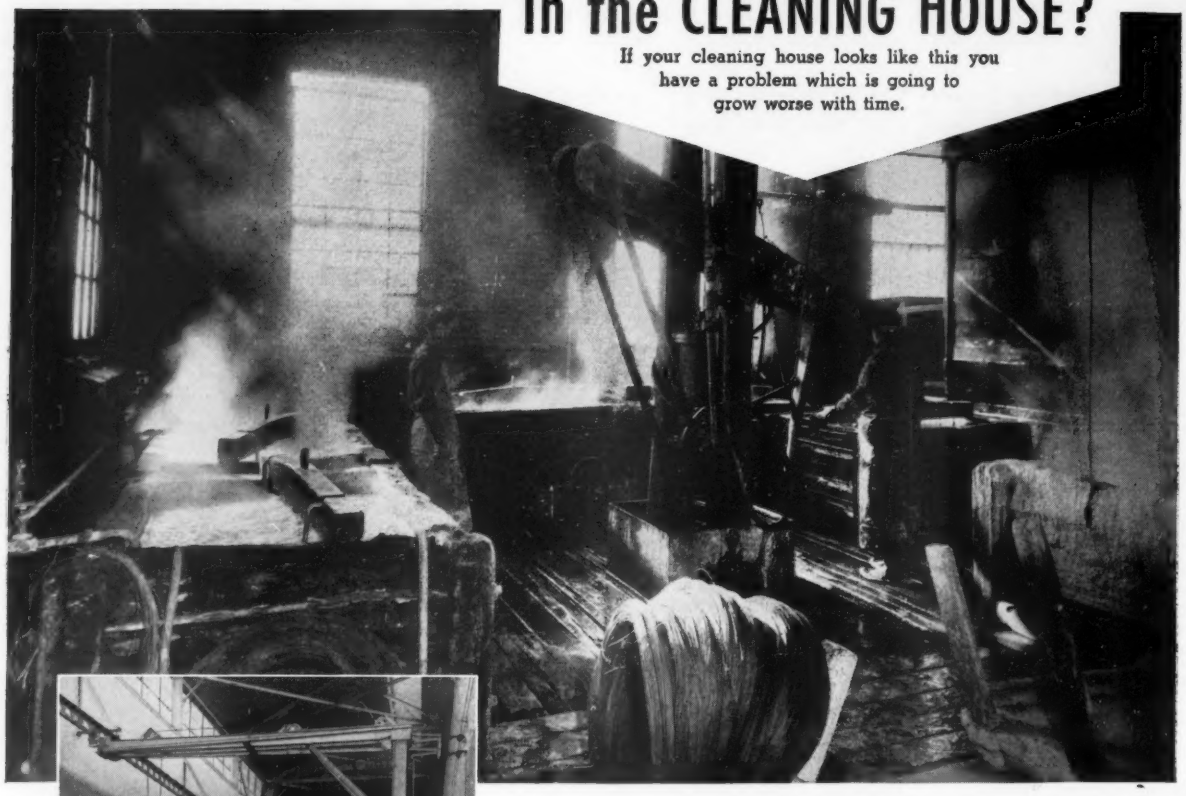
Member WAS

FRANKFORT, ILLINOIS

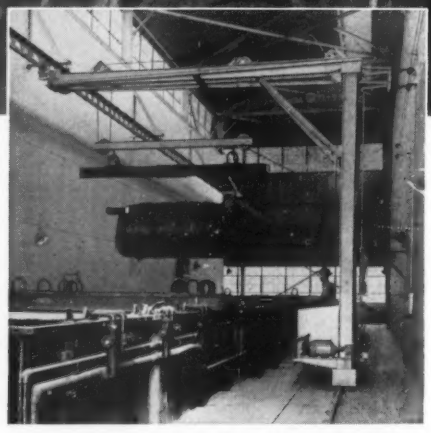
(A suburban Chicago area city)

Telephones: 2131 - 2141

Are You Still Using 19th CENTURY METHODS In the CLEANING HOUSE?



If your cleaning house looks like this you have a problem which is going to grow worse with time.



It might surprise you, but when you clearly analyze it, you may discover that you actually are paying for a modern arrangement like this without having it. That is because of the great savings a modern cleaning house equipped with a Cleveland Tramrail gantry crane provides over the old jib-crane layout.

IF YOU are still working with the old revolving jib crane in your cleaning house, it is high time that you modernize. In this day and age you cannot continue to successfully meet competition with slow cumbersome old-fashioned methods.

As these pictures so realistically demonstrate, the differences between cleaning houses of yester-year and modern Cleveland Tramrail equipped ones is like that between night and day. From every standpoint: production costs, volume of output, cleanliness, orderliness, working conditions, the modern cleaning house is greatly superior.

Most cleaning houses today are modernized. You cannot afford to buck the trend. Cleveland Tramrail has had a tremendous amount of experience in this field and will be glad to work with you. Why not let our local sales engineer go into your problem without obligation.

GET THIS BOOK!

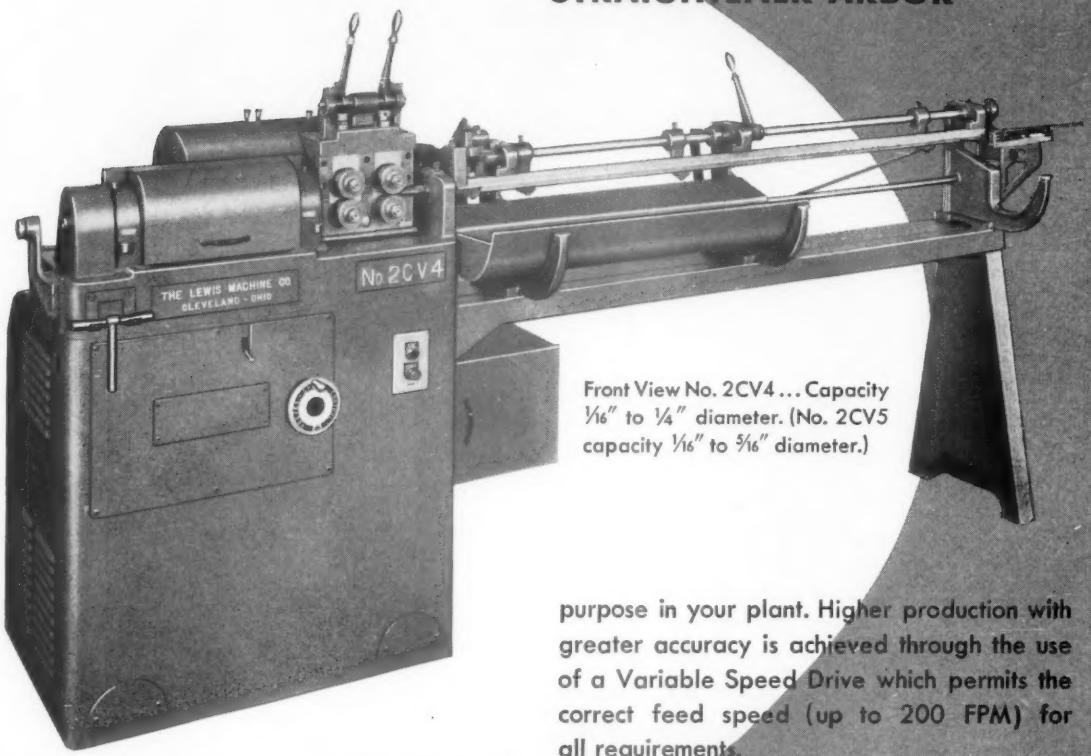
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
9222 EAST 288 STREET, WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

THE NEW **LEWIS** *Convertible**

AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINES WITH VARIABLE SPEED DRIVE AND DUAL-CENTER STRAIGHTENER ARBOR



Front View No. 2CV4 ... Capacity 1/16" to 1/4" diameter. (No. 2CV5 capacity 1/16" to 5/16" diameter.)

* The new Lewis No. 2CV series is equipped with our Dual-Center Rotary Straightener Arbor and can be quickly converted to handle shapes by installing our interchangeable Roll Straightener.

This convertible feature introduces a new flexibility in wire straightening and cutting operations . . . one machine can serve a double purpose in your plant. Higher production with greater accuracy is achieved through the use of a Variable Speed Drive which permits the correct feed speed (up to 200 FPM) for all requirements.

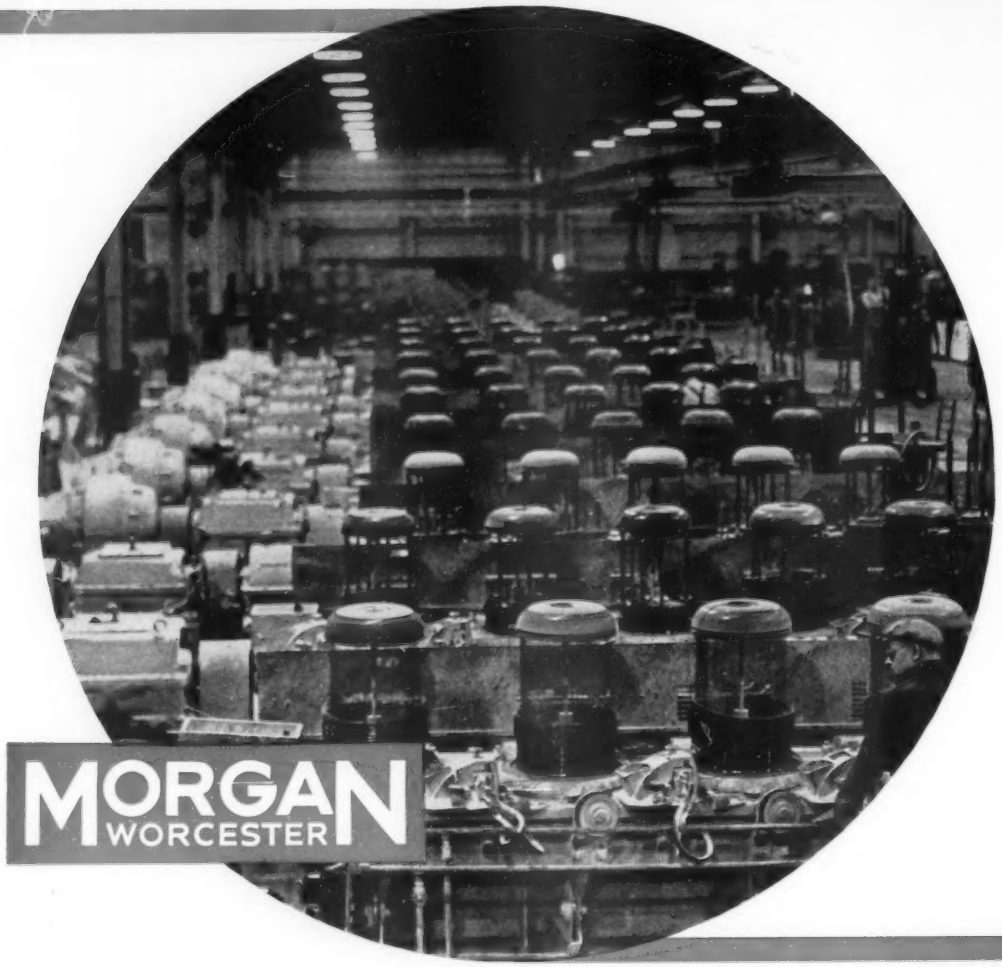
The outstanding feature of this series is the DUAL-CENTER STRAIGHTENER ARBOR (Pat. Pending) for round wire. This feature increases the range of the machine and makes it possible to precision straighten small diameters below the capacity of other machines.

Other models available to handle .012" to 1" diameter, as well as shapes.

THE LEWIS MACHINE COMPANY

3441 East 76th Street • Cleveland 27, Ohio • A Division of Curtis Mfg. Co.

MORGAN-CONNOR WIRE MACHINES



Economy of Operation

High production per man hour

High production per unit of floor space

Low maintenance cost

Low power cost

MORGAN CONSTRUCTION CO.

WORCESTER, MASSACHUSETTS

WM-100

ROLLING MILLS MORGOIL BEARINGS WIRE MILLS REGENERATIVE FURNACE CONTROL EJECTORS GAS PRODUCERS

WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 34 February, 1959 No. 2

Designated as Official Publication By The Wire Association

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PB-120-T Box and Skid Unit equipped with tiering lugs.

REPUBLIC STEEL

Boxes and Skids

For Handling Wire and Wire Products

Design and construction features of Republic Boxes and Skids help speed movement of materials, conserve storage space, produce savings in all phases of materials handling. Fabricated from heavy-gage steel sheets, they feature deep reinforcing ribs for maximum strength and rigidity.

Units like the PB-120-T, shown above, are manufactured in a wide range of sizes. Republic Materials Handling Engineers will be happy to work with you in designing boxes and skids to meet your specific requirements. There is no cost or obligation for their service.

Write for Catalog 620 on the complete line of Republic Materials Handling Equipment.

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BERGER DIVISION
DEPT. WP-2098A
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Name_____ Title_____
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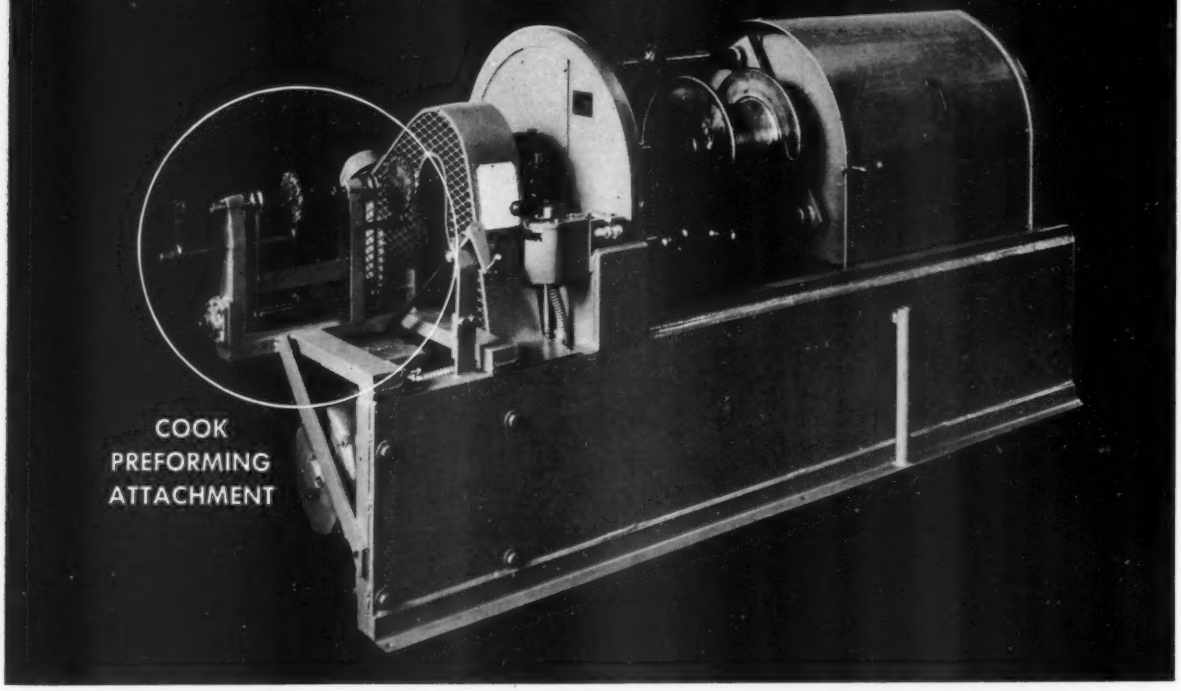
COOK BUNCHERS

MAKE WIRE AS CONCENTRIC AND PERFECT AS STRANDING EQUIPMENT



Cut Insulating Material and Labor Costs... Speed Production

CHOOSE THE CAPACITY THAT MEETS YOUR NEEDS

MODEL	REEL SIZE	CAPACITY
B-H-8	8" x 6"	45 lbs.
B-H-12	12" x 8½"	90 lbs.
B-H-16	16" x 8½"	200 lbs.
B-H-22	22" x 11"	500 lbs.
B-H-24	24" x 10½"	1000 lbs.
B-H-30	30" x 11"	1000 lbs.

CAPACITY BASED ON SOLID COPPER WIRE

MEET MILITARY SPECIFICATION: MIL-W-5086

For production of either concentric wire, where layers are made up of wires in opposite direction of lay, or semi-concentric wire, where layers are made up of wires in the same direction but with different lay to prevent strand locking, you can't beat a Cook Buncher. The single twist flyer, large take-up reel and automatic lay control are three of many features which enable Cook Bunchers to deliver perfectly bunched wires at high speed—so perfect that they pass through an extruding die of only 1 mil clearance. This perfect wire eliminates wasted time and material when insulating. Can you use this kind of dependable production? Write today for complete information.

ALSO ASK ABOUT COOK CABLERS

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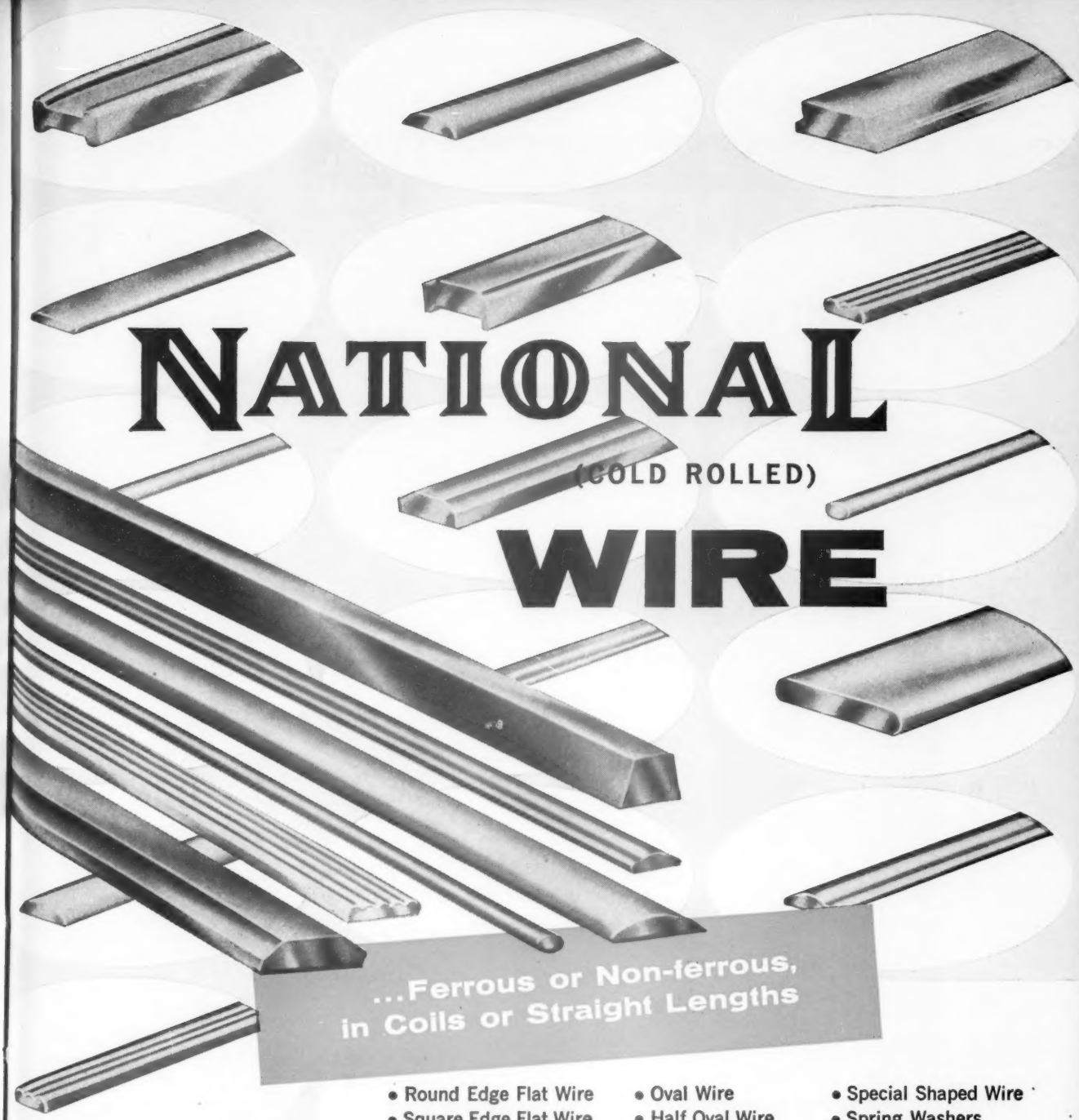


NATIONAL

(COLD ROLLED)

WIRE

...Ferrous or Non-ferrous,
in Coils or Straight Lengths

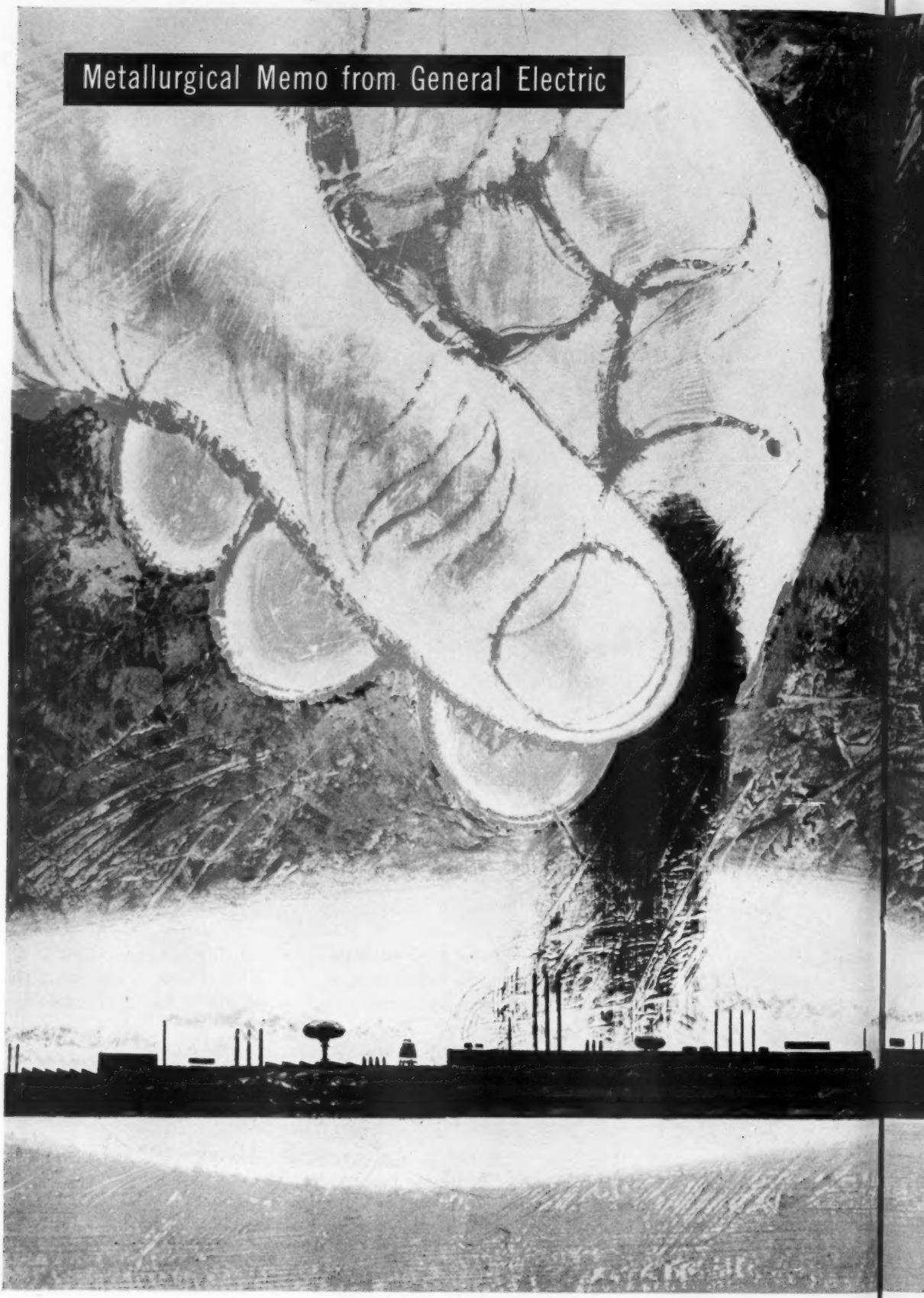
- Round Edge Flat Wire
- Square Edge Flat Wire
- Keystone Shaped Wire
- Oval Wire
- Half Oval Wire
- Half Round Wire
- Special Shaped Wire
- Spring Washers
- Retaining Rings

Complete Metallurgical Service

The NATIONAL LOCK WASHER COMPANY

Precision Shaped Wire Division

NEWARK 5, NEW JERSEY MILWAUKEE 2, WISCONSIN


Metallurgical Memo from General Electric

New route for a pinch of powder

Metallurgical Products Department reports on Carboloy® cemented carbides . . . and on a new distribution policy that will give you faster service on Carboloy dies

Carbides are metal powders. Cemented and formed in die shapes, Carboloy cemented carbides have become one of the principal cost cutters in the wire industry.

Now, Carboloy cemented carbide dies are available from Authorized Carboloy Die Distributors in all major wire drawing areas. Here's how these new distributors will benefit you as a die user:

- **Standard die stocks.** You'll get off-the-shelf delivery on standard draw, heading and extrusion dies. Every die is made from highest quality Carboloy cemented carbide.
- **Faster, more complete service.** Whether you need special die fabrication or die refinishing, service is faster because it is *local*. Die problems can be analyzed and solved right in your own plant.

You'll get longer, more economical service from Carboloy dies because you can choose from *nine* grades of Carboloy cemented carbide for your special die needs. Your Authorized Carboloy Die Distributor can help you select the die that will give you the lowest operating cost.

Next time you need dies, it will pay you to call your Authorized Carboloy Die Distributor. See box at right for the distributor nearest you. *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Ave., Detroit 32, Michigan.*

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CEMENTED CARBIDES

AUTHORIZED CARBOLOY® DIE DISTRIBUTORS

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METALLURGICAL PRODUCTS DEPARTMENT
GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS
MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

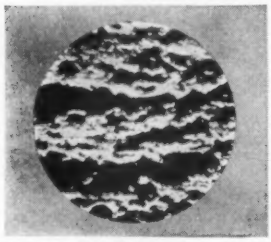
save on steel! save on acid! save on pickling costs!

. . . with Amchem Rodine!

Exhaustive comparison tests with competitive materials prove time and again Amchem Rodine's superiority in performance, with substantial savings in costs, acid and steel in the bargain.

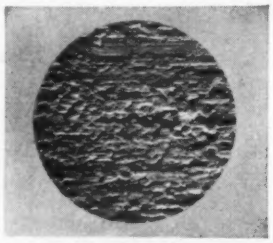
Amchem Rodine pickling acid inhibitors retard the attack of acid on the metal without lessening its capacity to remove scale. Not only do they save in metal and acid, but they reduce production costs and their efficiency improves the quality of the pickled product as well.

If you are now using an inhibitor in your pickling bath, you'll want to investigate the three way savings highly concentrated Amchem Rodine can effect. Find out now about this superior Amchem inhibitor development, ask about our full time technical and engineering assistance program, and check Amchem for service you can depend on long after the sale!



Effect of Uninhibited Acid

This microphotograph of a low-carbon sheet steel panel pickled in uninhibited sulfuric acid shows deep etching and the pitted character of the surface after 5 minutes in the solution.



Effect of RODINE-INHIBITED Acid

Panel pickled for 5 minutes in Rodine-inhibited sulfuric acid, then microphotographed. Only scale pockets and roll marks are visible; no pitting of the low-carbon sheet steel occurred!

Write for free Bulletin 1381 with handy selection chart showing characteristics of and uses for typical Rodine Pickling Acid Inhibitors, and Bulletin 1448 on Amchem Cuprodine, the simple non-electrolytic immersion process for producing bright, adherent copper coatings on carbon and stainless steels.

AMCHEM
AMCHEM RODINE

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3 GREAT NEW Motoblox®

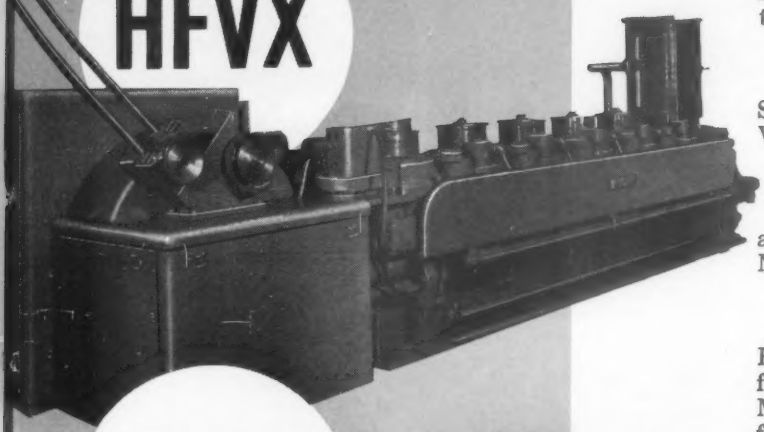
engineered for today's demands

by Vaughn®

HRK

Exceptionally effective cooling on the Vaughn HRK Motoblox is provided by water circulating in the interior of the 27″ diameter intermediate blocks, augmented by an external blast of air. Ample wire storage is assured by offsetting the individual block units on this "straight-through" rod machine.

HFVX



Superseding a previous model, the Vaughn HFVX Motoblox is the ideal machine for drawing the smaller sizes of alloy and high carbon steels. Speed, cooling, flexibility, and safety are effectively combined in this modern Motoblox.

HFFV

For those still finer sizes that are preferably drawn *dry*, the Vaughn HFFV Motoblox is the answer! Sizes ranging from .025″ diameter and finer may be finished on this 8″ diameter block version of the Motoblox, with or without spooler.

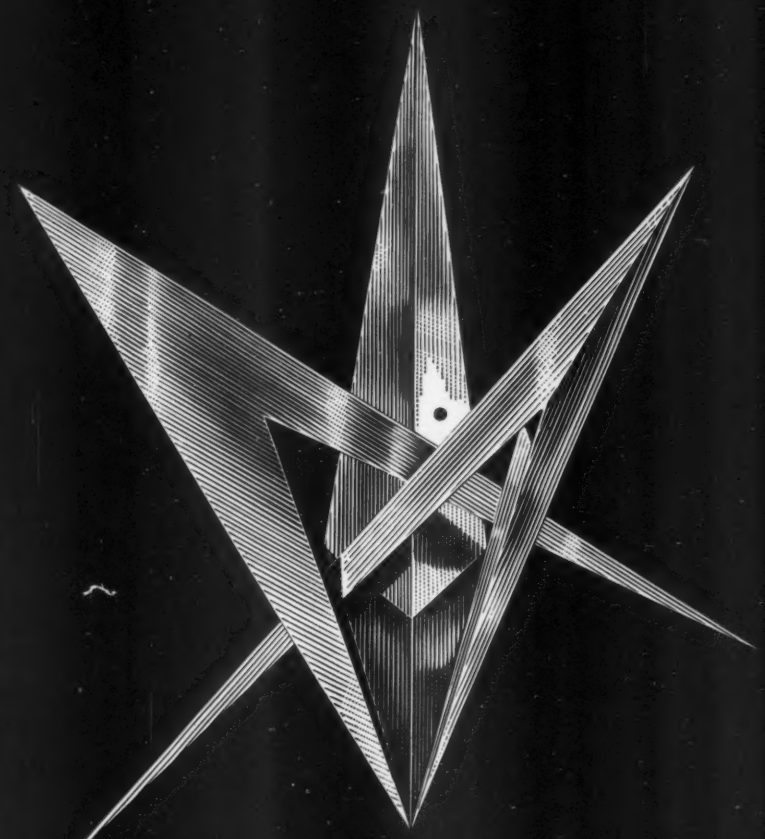
"Quick on the Draw!"

Ⓥ®

THE VAUGHN MACHINERY COMPANY

Cuyahoga Falls, Ohio, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.



SERVICE
IN STAINLESS STEEL

"FLIGHT OF PROGRESS"
a stainless steel sculpture by Robert Edward Hamilton

In the past 12 months 91% of all orders for J&L stainless steel bars were shipped, *at least* in part, within 24 hours.

That's service!

The key to such service is a simple one: Complete and balanced inventories at the Mill *and* at strategically located Service Centers only hours from *your* plant or warehouse.

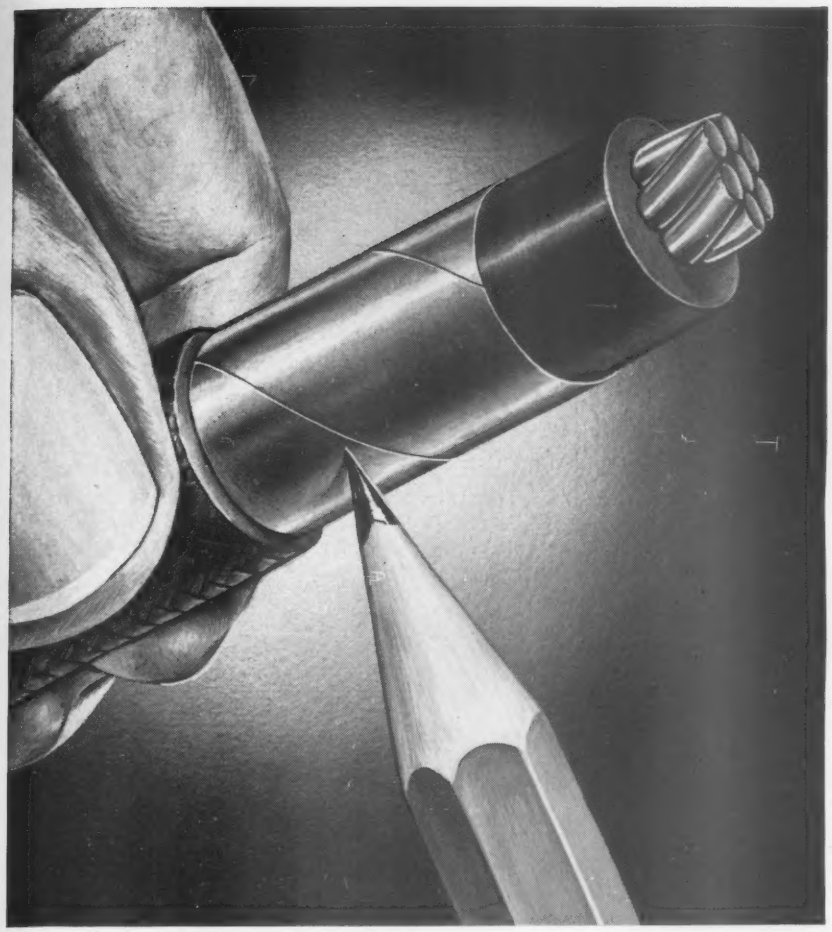
With the most modern flat rolling facilities in the industry now in operation at Louisville, Ohio, J&L is now giving the same service on flat rolled products that fabricators and warehouses have been getting on J&L bars and wire.

Whether you need stainless sheet, strip, bar or wire for your production line or your warehouse customers, *you can get it faster from J&L.*

Plants and Service Centers:
Los Angeles • Kenilworth (N. J.) • Youngstown • Louisville (Ohio) • Indianapolis • Detroit

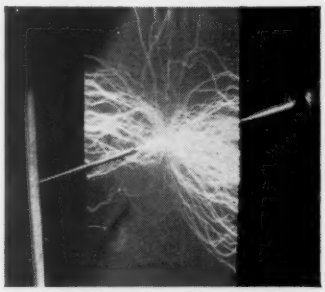
J&L
STAINLESS
SHEET • STRIP • BAR • WIRE

Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • Box 4606, Detroit 34



PROPERTIES OF "MYLAR"

"Mylar" offers a unique combination of properties that may help you improve performance and lower costs of *your* product. Here are two of the many important properties for evaluation.



HIGH DIELECTRIC STRENGTH: Average of 4,000 volts per mil . . . average power factor of 0.003 at 60 cycles.

SUPERIOR CHEMICAL RESISTANCE: Unaffected by oils, grease, most acids and alkalis, moisture and solvents.

NATIONAL ELECTRIC REPORTS . . .

Tapes of Du Pont MYLAR® help improve building-wire performance . . . cut manufacturing costs

PROBLEM: National Electric Products Corp., Pittsburgh, was seeking a higher-quality material to replace rubber-filled cotton tape used in their building wire. At the same time, they were looking for ways to cut manufacturing costs.

SOLUTION: Du Pont "Mylar"* polyester film. *And "Mylar" costs less on a square foot basis than rubber-filled cotton tape.* Tests proved a tape of "Mylar" immersed in water for 12 hours absorbed less than 1% of its weight vs. 32% for rubber-filled cotton tape. Building wire using 1 mil "Mylar" had 4 times the abrasion resistance of wire using 10 mil rubber-filled cotton tape.

RESULTS: Reduced wire diameter and weight. In manufacturing, "Mylar" permits additional savings because reduced cable diameter requires less braided outer covering material. The physical toughness of "Mylar" gives extra safety against damage by flexing, pinching, bending and abrasion. Resistance to moisture and normal atmospheric oxidation is improved.

HOW CAN "MYLAR" HELP YOU? Whether you use heavy duty cable, motors, transformers or miniaturized capacitors, it will pay you to investigate the performance benefits of "Mylar". Component makers find this tough, thin film often costs less on an area basis than present insulation. For detailed information, send in the coupon.

DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT **MYLAR**® POLYESTER FILM

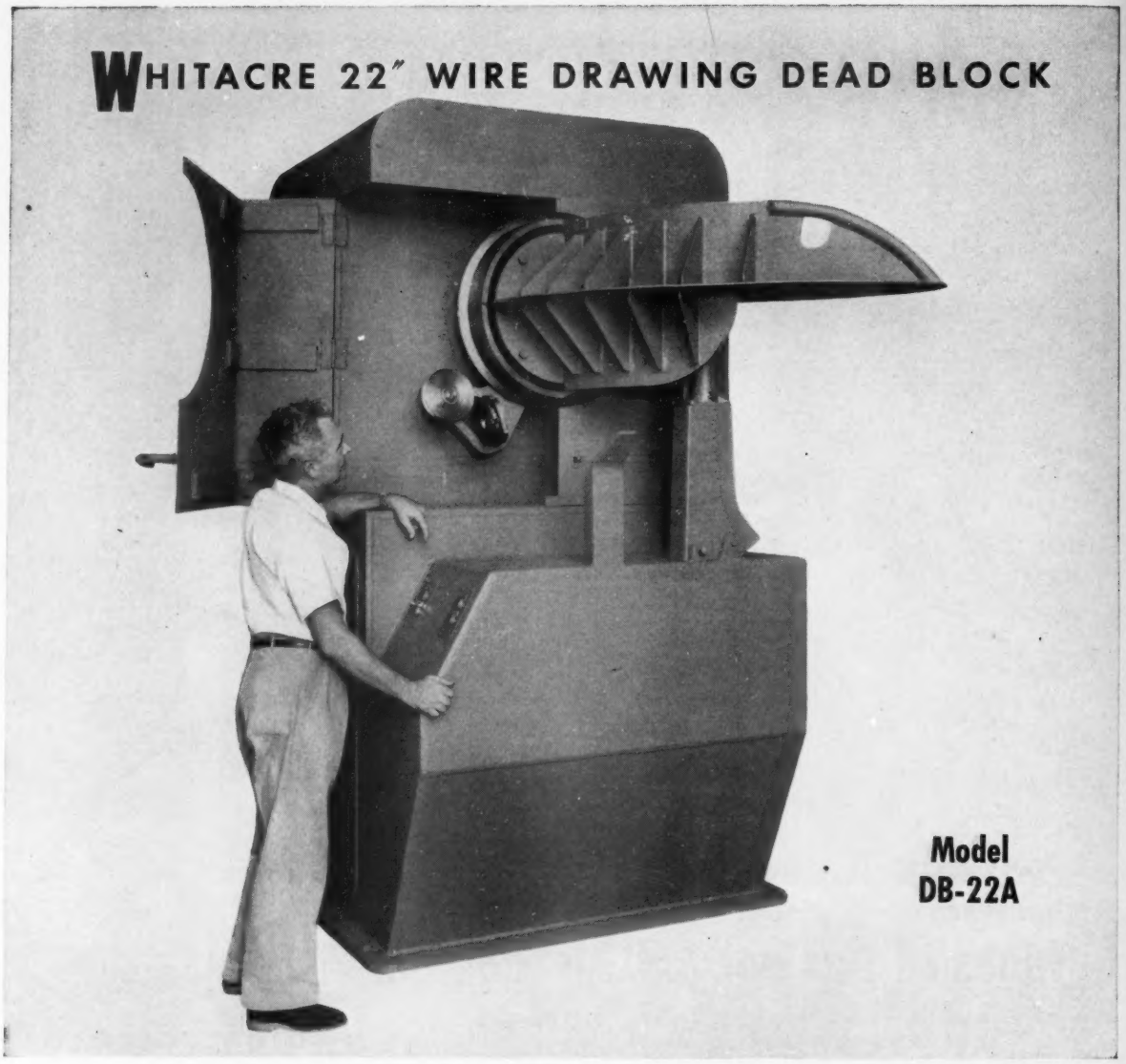
*"**MYLAR**" *is Du Pont's registered trademark for its brand of polyester film.*

E. I. du Pont de Nemours & Co. (Inc.)
Film Dept., Room EG-2, Nemours Bldg., Wilmington 98 Del.

Please send booklet listing properties, applications and types of "Mylar" polyester film available (MB-11).

Application_____
Name_____ Title_____
Company_____
Address_____
City_____ State_____

WHITACRE 22″ WIRE DRAWING DEAD BLOCK



Model DB-22A

Continuous Production—Efficiency Approaching 100%

Gives you these advantages

Continuous increased production achieved by: • No down time for stripping • Permits packaging into stationary container or uninterrupted palletizing on stems • No tangling nor snarling from handling • Design simplicity. No back-gearing nor similar mechanisms • Greatly reduced floor space requirements • Dies in supplying drawing machine can be changed without stopping dead block • Accumulation type machines can be "run down" without stopping dead block • Continuous inspection and sampling • Breaks welded in production — low scrap loss • Increased production with lessened operator fatigue • Maintenance eliminated except for occasional lubrication of four main bearings and two motor bearings • Dead block can be located anywhere with wire literally piped from wire drawing machine • Extra large packages for in-process wire • Greatly reduced handling and in-plant transportation costs • Low capital investment.

OTHER MODELS AVAILABLE

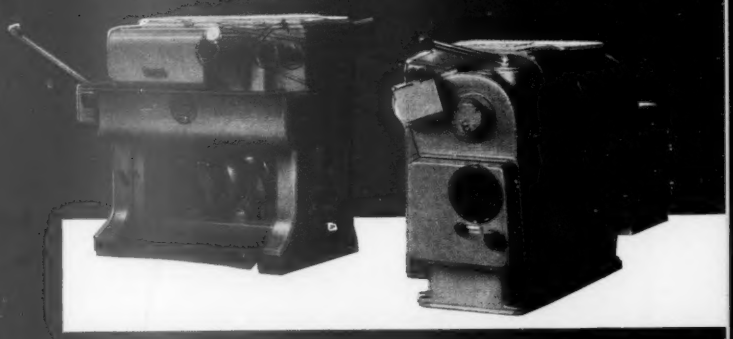
16″ Wire Drawing Dead Block, Model DB-16A • 26″ Wire Drawing Dead Block, Model DB-26A • Combination 16″ and 22″ Galvanizing or Tinning Dead Block Take-ups, Model GB-2216A • 26″ Heavy Wire Galvanizing or Tinning Dead Block Take-up, Model GB-26B.

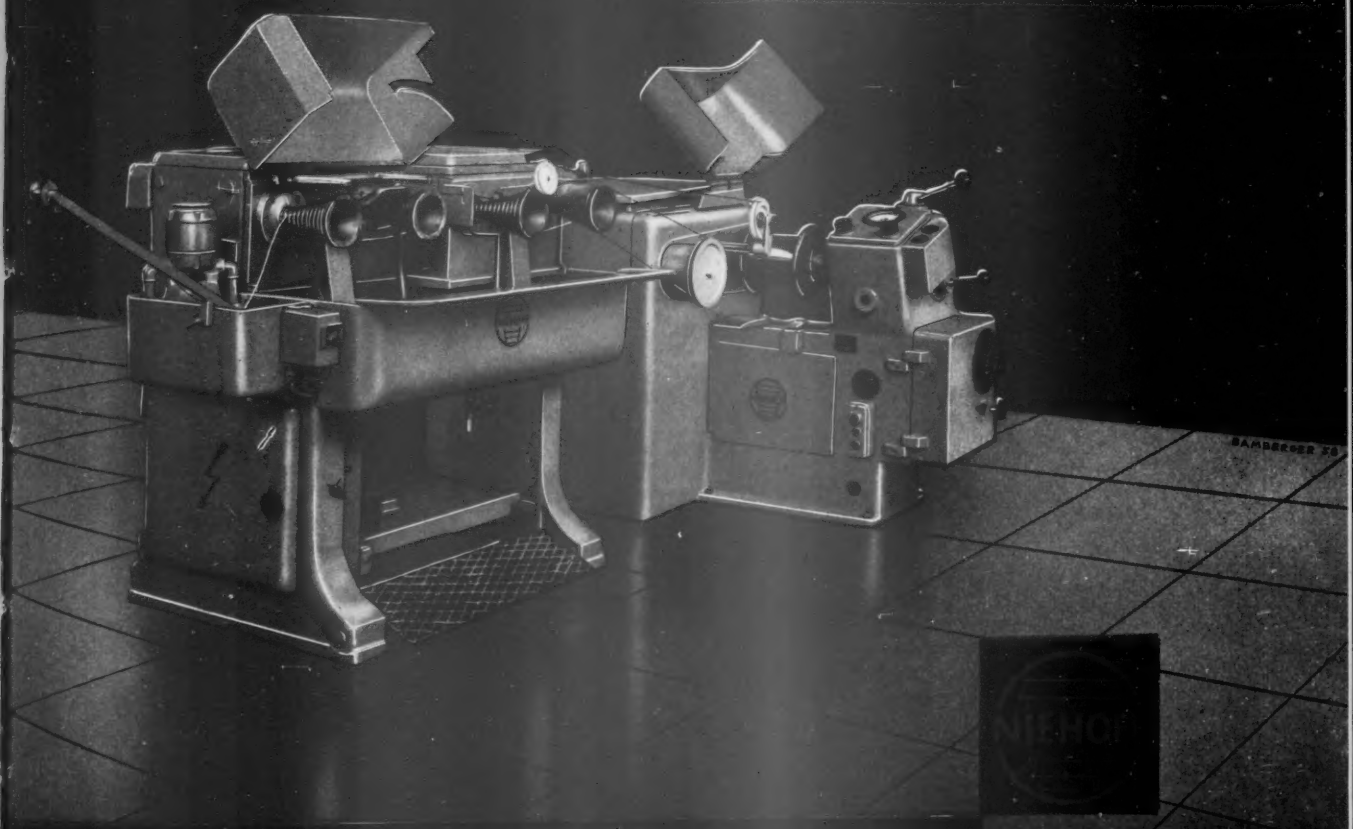
Write Today For Specifications And Name Of Nearest Distributor

WHITACRE ENGINEERING & MANUFACTURING COMPANY

5649 ALHAMBRA AVENUE • LOS ANGELES 32, CALIFORNIA • CAPITOL 5-2476

NIEHOFF WIRE DRAWING UNITS





NIEHOFF MACHINE WORKS

SCHWABACH NEAR NURNBERG WESTERN GERMANY

Place Your Order **NOW** *for*

THE NEW AND REVISED 1959 EDITION OF THE

WIRE AND WIRE PRODUCTS BUYERS' GUIDE

AND YEAR BOOK of THE WIRE ASSOCIATION

The many new headings, new products, address changes and other important information changes in the listings of sources of bars, rods, wire, wire products, electric wire and cable and of sources for machinery, equipment and supplies used in the Wire Industry, make this directory

INDISPENSABLE!

The YEAR BOOK SECTION is completely new. It contains information to keep you posted on the affairs of THE WIRE ASSOCIATION, such as:

OFFICERS AND DIRECTORS FOR 1959.

LISTS OF ASSOCIATION MEMBERS BY INDIVIDUALS AND COMPANIES.

LIST OF MEDAL AWARD WINNERS AND HONORABLE MENTION AWARDS.

CONSTITUTION AND BY-LAWS OF THE ASSOCIATION.

HISTORY OF ASSOCIATION ACTIVITIES, DURING 1958.

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WIRE AND WIRE PRODUCTS

453 MAIN STREET ● **STAMFORD, CONN.**

flowability

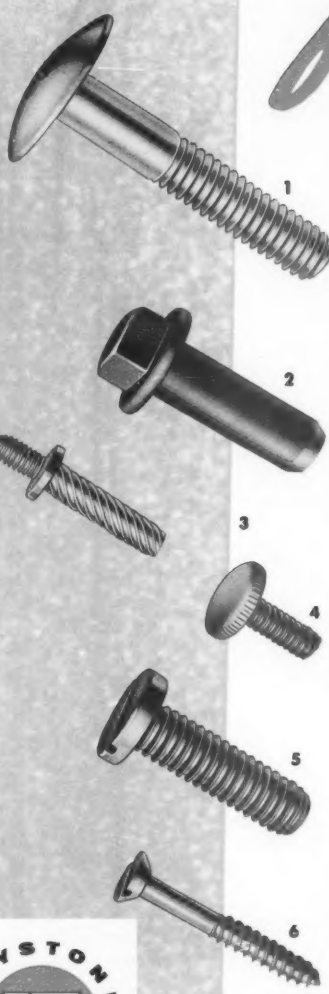
IS THE SECRET...

of INDIANA METAL PRODUCTS CO.'S continued success in cold heading quality fasteners

"Our objective is to give our customers a superior product at a competitive price," says Norbert Schroeder, General Manager of Indiana Metal Products Co., Division of Textron Inc., Rochester, Indiana.

To achieve this goal, Indiana specifies Keystone "XL" Wire for the manufacture of cold headed fasteners. "XL" *flowability* keeps costs competitive by eliminating downtime and secondary operations as well as increasing tool life. *Flowability* makes a superior product free from fractures, with perfectly filled corners, collars and excellent surface characteristics. This results in superior products at lowest cost.

Keystone "XL" Wire can help you, too, produce a better quality product at a competitive price. Talk it over with your Keystone representative—or call us—today!



XL's *flowability* makes possible . . .

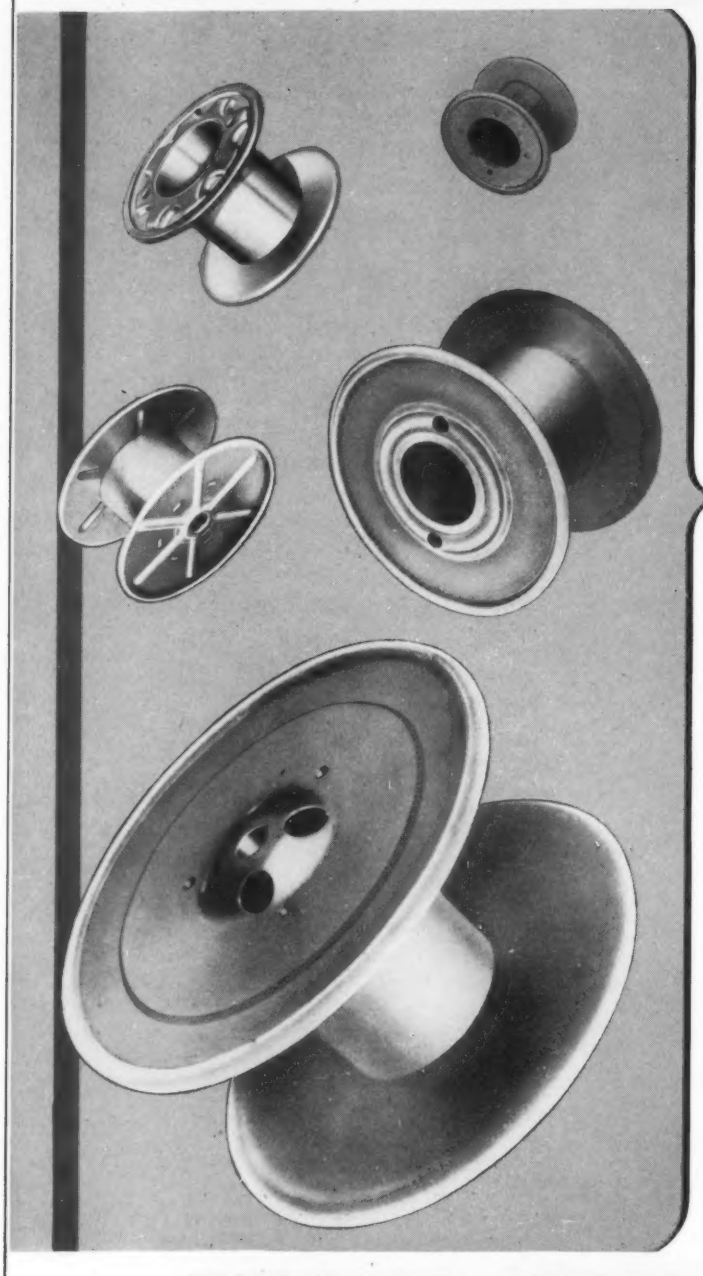
1. Bleacher bolt—extra large head, deep Phillips recess—2 blows 2. Brake assembly stud—round collar and square head formed simultaneously 3. Plastic-to-metal fastener—2 blows—2 diameters plus collar 4. Adjusting screw—5 diameters 5. Flat pan head—must be perfectly flat 6. Twin-fast wood screw—headed and slotted in a single blow. XL quality makes possible roll threading of this twin-fast screw with sharp *double lead* threads

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE

WIRE FOR INDUSTRY

HUBBARD HAS IT . . .



IF IT'S A SPOOL OR REEL
HUBBARD MAKES IT!

Every type: Steel, Wood, Plywood, Masonite, Cardboard, Aluminum, Plastic.

If your requirements call for Spools or Reels, Call Hubbard.

Many types and constructions of Steel Spools and Reels for Shipping and Processing use in plain, painted or plated finishes.

In addition to our expanded line of standard sizes, we also have facilities and equipment for producing custom-designed Spools and Reels to your specifications.

The combined manufacturing, engineering and sales facilities of Hubbard and American Pulley are ready to serve your every spool and reel requirement.

Address your inquiries to:

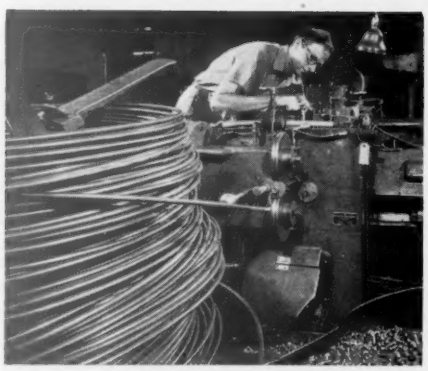
HUBBARD SPOOL DIVISION

OF

The American Pulley Company

GARRETT, INDIANA

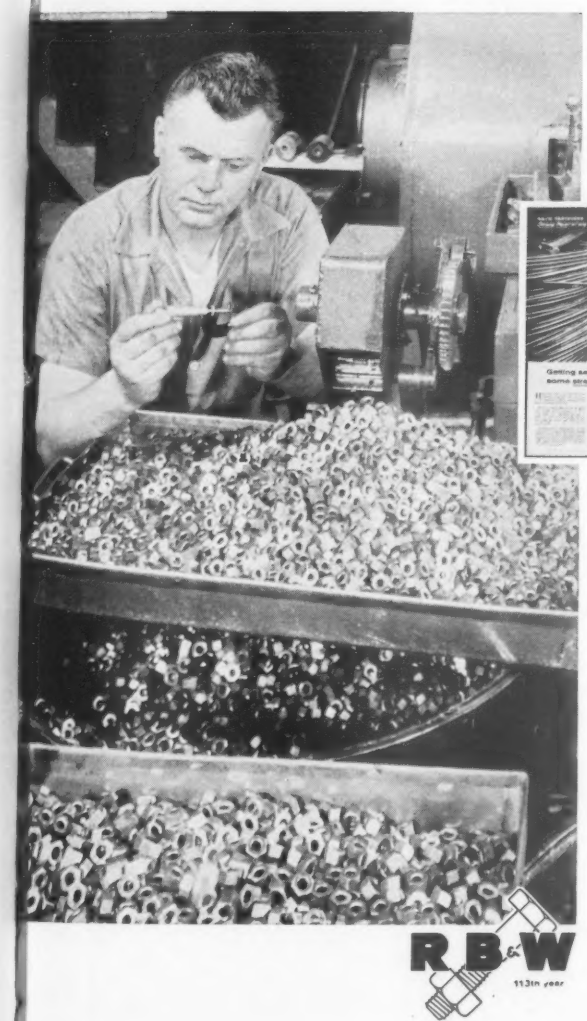
Telephone: Garrett 840



This modern Cold Header forces wire drawn from Youngstown Rods to flow inside the dies. It spills out bolt or screw blanks by the thousands— every hour, all day long.

Accent on Excellence

Youngstown cold heading and scrapless nut quality rods and bars



Russell, Burdsall & Ward Bolt and Nut Company of Port Chester, N. Y. is one of the world's largest and best known fastener producers with plants at Coraopolis, Pa., Rock Falls, Ill., and Los Angeles, Calif. They stated in one of their recent advertisements:

"The cold heading method (an RB&W development that revolutionized bolt making) calls for use of uniform, high quality raw material. With constant quality control, RB&W makes sure our cold headers get the proper 'diet'."

Youngstown's Cold Heading and Scrapless Nut Quality Rods and Bars in coils answer RB&W's rigid requirements. They find them to be internally sound, uniform in both physical structure and chemical composition—as well as free from injurious seams and slivers, which cause rejects, reduced profits.

Wherever steel becomes a part of things *you* make, the high standards of Youngstown *quality*, the personal touch in Youngstown *service* will help you create products with an "accent on excellence".

QUALITY YOUNGSTOWN SERVICE

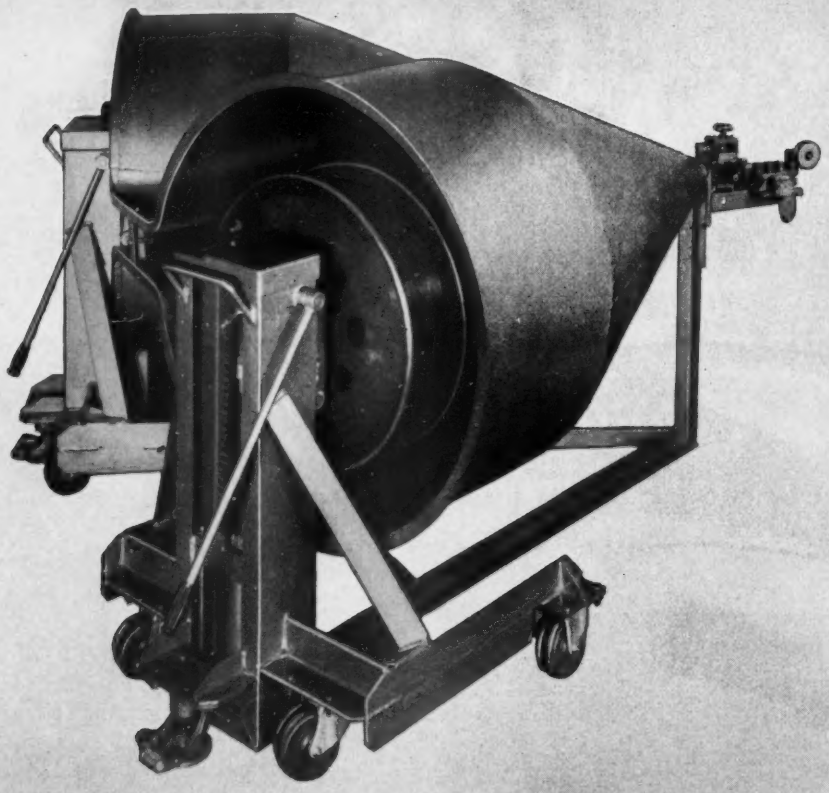
THE

YOUNGSTOWN

SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel
Youngstown, Ohio

STEP UP YOUR EXTRUDER LINE CAPACITY



SIMPLIFY REEL HANDLING PROBLEMS WITH THIS ENTWISTLE HIGH SPEED UNIT.

Your extruder line operation will reach a new high in speed and efficiency with the Entwistle Dual Flyer Pay-Off. This unit enables continuous pay-off of wire at speeds in excess of 3500 FPM, reel weights up to 1500 lbs., and wire sizes down to No. 26 A.W.G.

Switch-over to the second reel is accomplished automatically through a polished steel opening in between the hoods. Braking of reels and all inertia problems are non-existent with this type of pay-off. Dual hydraulic reel trucks make loading and unloading of reels a much simpler operation.

Find out what the Entwistle Dual Flyer Pay-Off can do for your extruding operations. Write or phone for complete details.

ENTWISTLE

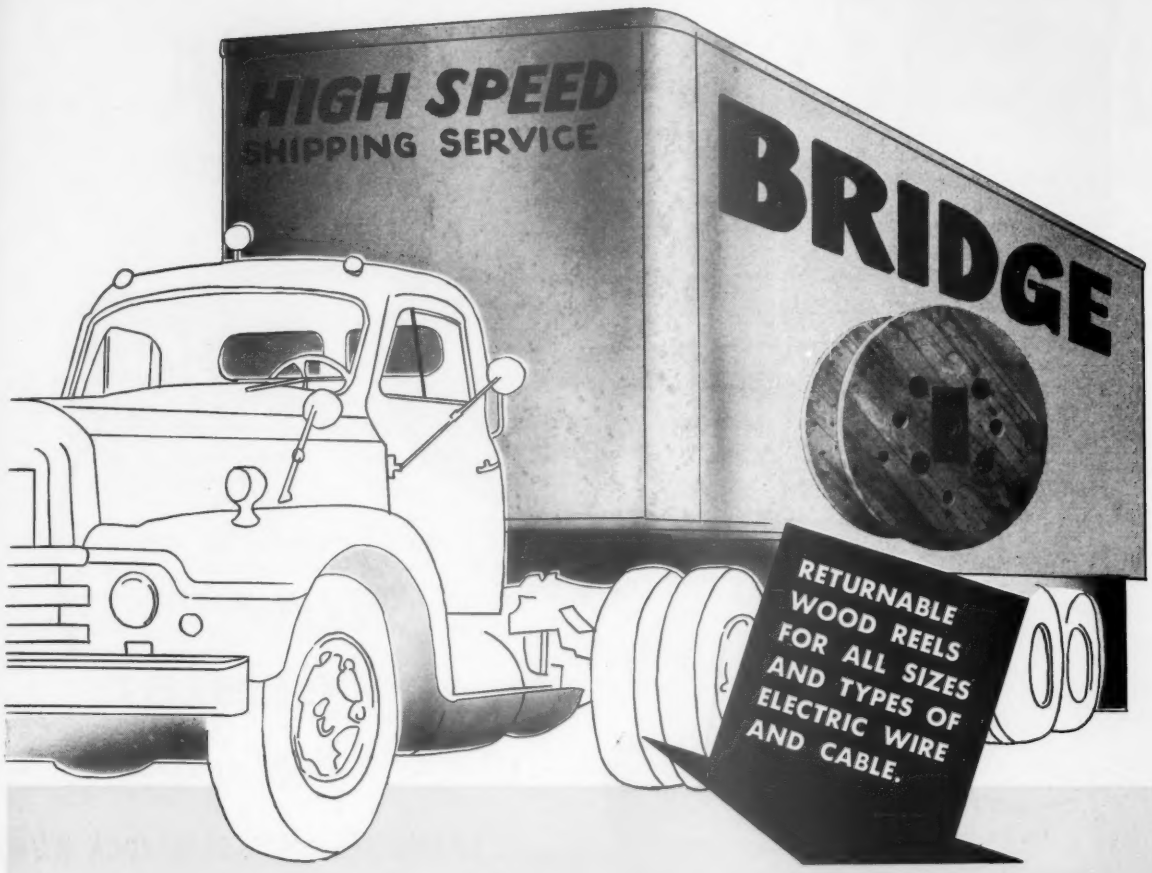
Manufacturing Corporation

1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

Over 40 years of dependable service to the Wire Industry

Europe, South America, Mexico
FOREL EQUIPMENT CORPORATION
30 Church Street, New York 7, New York

British Associates
THE KEMSON ENGINEERING CO., LTD.
Wellington Mill, Bolton Road
Blackburn, Lancs., England

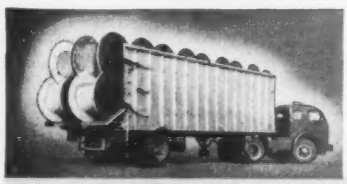


EVERY TYPE OF WOOD REEL—

Returnable or Non-Returnable for the WIRE INDUSTRY . . . from 10" to 10' in diameter.

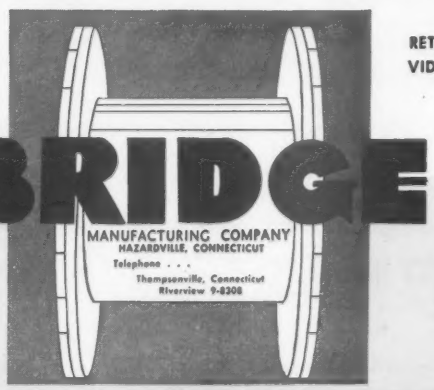
STRAIGHT LINE production methods produce accurately-made REELS of HIGHEST QUALITY at prices that make it good business to buy from BRIDGE.

A completely MODERN plant, with the very FINEST and FASTEST equipment, much of it specially designed for BRIDGE, assures you of rapid SERVICE and STRONG SERVICEABLE REELS.



HIGH SPEED
SHIPPING SERVICE IN OUR OWN TRUCKS

within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels within a few days east of the Mississippi.



RETURNABLE REELS ARE BUILT TO PROVIDE MANY TRIPS WITHOUT REPAIRS.

"REEL GOOD . . .

Let us quote on your reel needs. Send us your specifications. Better yet, visit our plant and see how and why Bridge reels are made so well at so low a cost.

WOOD REELS"

New easier way

... to use stainless steel lock wire!

Note how the lock wire, uncoiling from the inside, is dispensed as needed from a hole in the top of this compact 1-pound package. No wild uncoiling! Moreover, the wire is better protected, handles easier and faster, with less waste, and with greater safety!

Here is a new National-Standard packaging development that is a natural for most safety lock wire uses in equipment manufacture, assembly and servicing.

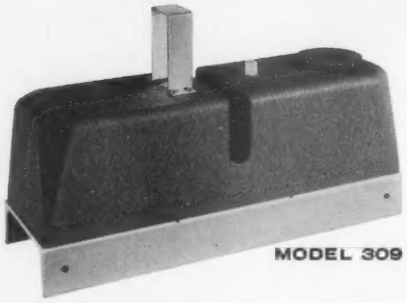
For production operation requiring larger capacities, National-Standard offers lock wire on practical 5 and 10-pound disposable spools that may be spindle-mounted.

Check with National-Standard on the spooling of your choice and on stainless steel lock wire in any diameter from 0.020 to 0.067 and to government specifications: QQ-W-423, AN-W-24, MIL-W-6713 or AMS-5685-C.

NATIONAL NS **STANDARD**

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; *fine wire, stainless, music spring and plated wires*
WORCESTER WIRE WORKS, Worcester, Mass.; *music spring, stainless and plated wires, high and low carbon specialties* • **REYNOLDS WIRE, Dixon, Ill.;** *industrial wire cloth*
WAGNER LITHO MACHINERY, Secaucus, N. J.; *metal decorating equipment* • **ATHENIA STEEL, Clifton, N. J.;** *flat, high carbon spring steels*

A MICROLIMIT CONTROL
on your wire production line assures



MODEL 309

- *optimum quality*
- *increased production*
- *closer tolerances*
- *savings in labor and materials*
- *reduced start-up wastage*

MODEL 310

MICROLIMIT CONTROL offers the most reliable . . . sensitive . . . versatile *measurement and control of insulated wire dimension* available anywhere. These rugged, *noncontact gauges* provide a high degree of accuracy, *regardless of wire speed.* In many applications, MICROLIMIT CONTROLS can be mounted *right at the die* . . . can measure materials in a *highly plastic state* . . . even in hot or smoky atmospheres. Check the features and specifications below:

	MODEL 309	MODEL 310
METHOD OF MEASUREMENT	Photoelectric pickup of obstructed light from a constant source—balanced against an unobstructed reference beam.	Photoelectric scanning by two light beams moving in tandem. Not affected by clouded atmospheres or deposits on lenses.
METHOD OF CONTROL	Deviation signals are fed to control console. Its output drives a conversion unit to alter capstan speed or any other production variable. Timing circuits regulate degree of correction . . . permit corrected wire to register before further control is exercised. Complete integrated systems are available.	
COMMON APPLICATIONS	Thermoplastic and rubber insulated wire . . . extruded tubing, rods, shapes, filaments . . . special wires.	Thermoplastic insulated cable . . . C.V. process and pan-cure rubber cable . . . extruded tubes, shapes.
STANDARD RANGES	.001/.025" . . . .025/.500" . . . .025/.750"	.075/1.0" . . . .075/2.0" . . . .075/3.0"
GAUGE SETTINGS	Direct setting with calibrated spindle . . . or, for utmost accuracy: 'zeroing' the deviation indicator on a standard reference rod.	Direct setting with digital knob control.
SENSITIVITY	± 0.1 mil	± 1.0 mil
RECOMMENDED LOCATIONS	Pan-cure rubber: between extruder and talc box. PVC & PE extruders: on either side of capstan. Teflon & Silicon extruders: between extruder and oven.	Generally: as close to die or extruder as desired.

For complete information, contact your local Daystrom-Weston representative . . . or write to Industrial Gauges, West Englewood, N. J. *In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 10, Ont. Export: Daystrom Int'l., 100 Empire St., Newark 12, N. J.*

DAYSTROM-WESTON

Industrial Gauges

A DAYSTROM UNIT

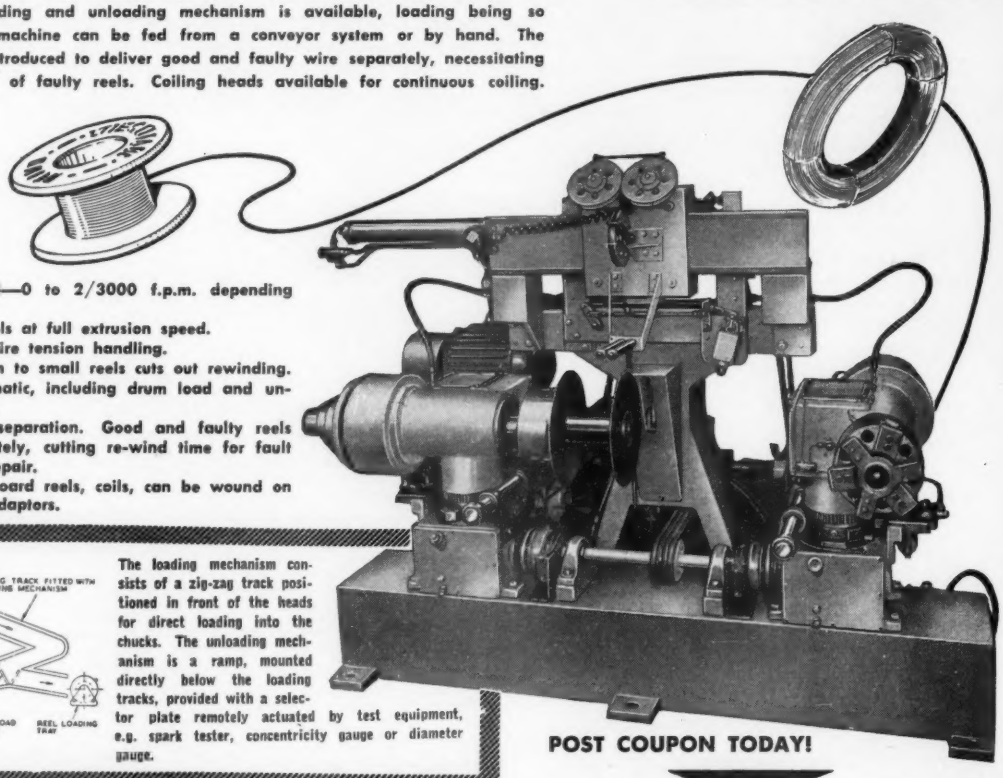
CABLE REELING REVOLUTIONISED!

NEW GENERAL TYPE TA 15 FULLY AUTOMATIC DUAL—REEL TAKE UP.

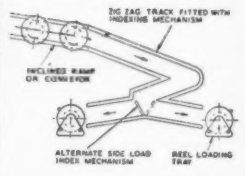
(PATENTS APPLIED FOR IN GREAT BRITAIN AND COUNTRIES ABROAD)

Here is an entirely automatic cable and wire reeling machine specially designed for reeling direct on to small diameter steel or despatch reels—entirely eliminating the operations of rewinding from large to small reels. Suitable for any continuous process, e.g. wire drawing, extruding or continuous vulcanising. 2½ lbs. operates accumulator. Reel speeds up to 2450 r.p.m. 4:1 reel build-up readily handled. A fully automatic loading and unloading mechanism is available, loading being so arranged that the machine can be fed from a conveyor system or by hand. The unloading unit is introduced to deliver good and faulty wire separately, necessitating only the rewinding of faulty reels. Coiling heads available for continuous coiling.

- ★ Continuous coiling
- ★ Continuous winding on to despatch reels
- ★ Continuous winding on to machine reels



- ★ High wire speed—0 to 2/3000 f.p.m. depending on reel size.
- ★ Wire changes reels at full extrusion speed.
- ★ Low controlled wire tension handling.
- ★ Direct winding on to small reels cuts out rewinding.
- ★ Completely automatic, including drum load and unload if required.
- ★ Automatic fault separation. Good and faulty reels delivered separately, cutting re-wind time for fault relocation and repair.
- ★ Steel reels, cardboard reels, coils, can be wound on different chuck adaptors.


ZIG ZAG TRACK FITTED WITH INDEXING MECHANISM
INCLINED RAMP OR CONVEYOR
ALTERNATE SIDE LOAD INDEX MECHANISM
REEL LOADING TRAY

The loading mechanism consists of a zig-zag track positioned in front of the heads for direct loading into the chucks. The unloading mechanism is a ramp, mounted directly below the loading tracks, provided with a selector plate remotely actuated by test equipment, e.g. spark tester, concentricity gauge or diameter gauge.

POST COUPON TODAY!

GENERAL ENGINEERING CO (RADCLIFFE) LTD.

MAKERS OF COMPLETE EXTRUSION LINES AND CABLE PROCESSING PLANT

GENERAL ENGINEERING CO. (RADCLIFFE) LTD.
Station Works, Bury Road, Radcliffe, Lancashire, England.
Telephone: RADcliffe 2291 (4 lines) Telegrams: "General," Radcliffe, Manchester.

Canadian Representation:
Dominion Electrohome Industries Ltd.,
Technical Products Division,
Kitchener, Ontario. Telephone: Sherwood 3-0271.

Represented in Australia, Austria, China, Denmark, Finland, France, Italy, Norway, Nyasaland, Poland, Rhodesias, Spain, South Africa, Sweden, Yugoslavia.

TO GENERAL ENGINEERING CO. (RADCLIFFE) LTD.
Please send Bulletin T.A. 15 for Fully Automatic Patented Dual reel Take-up.

Name .....

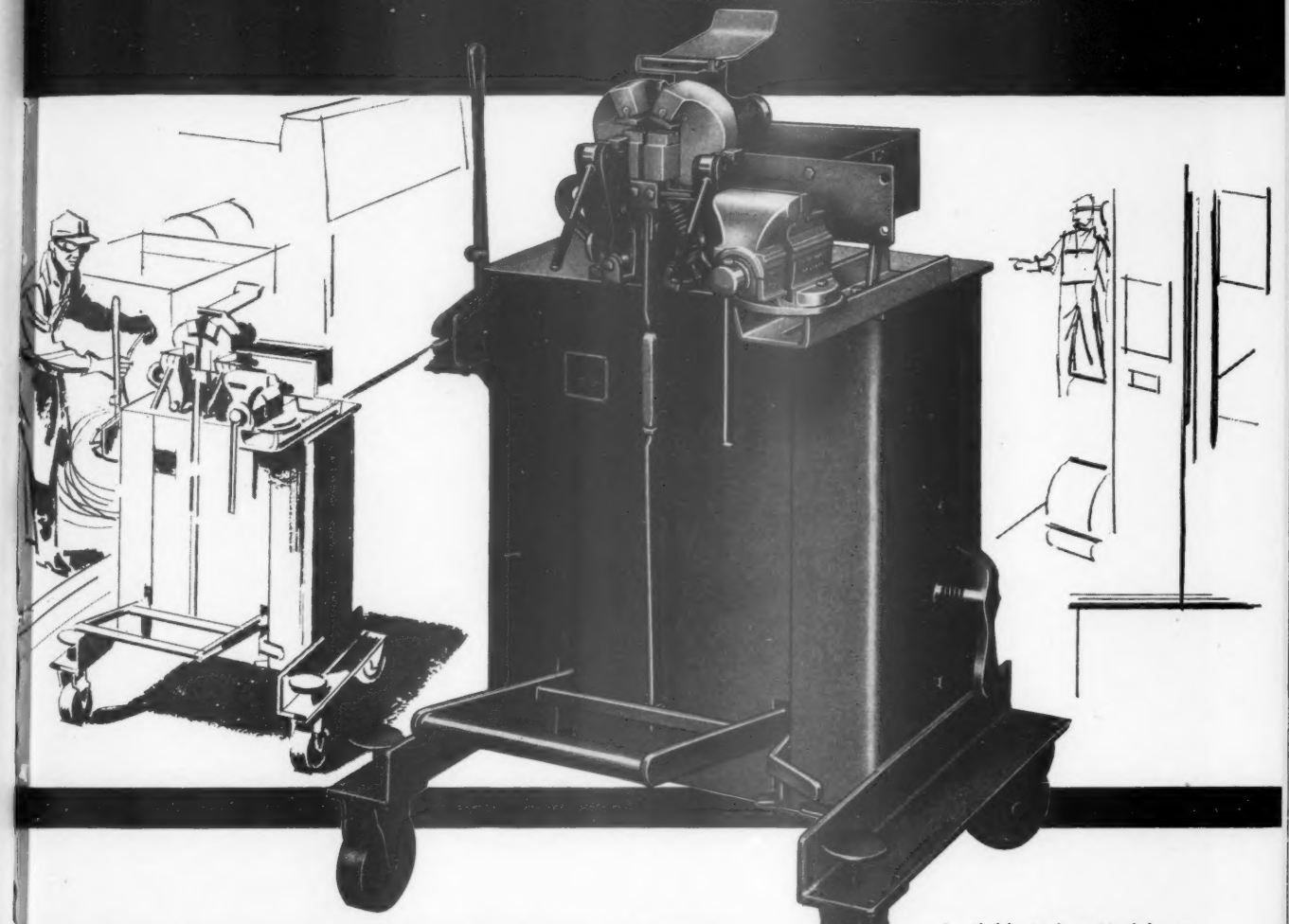
Position .....

Firm .....

FIRST..... *in the field*

FASTEST..... *automatic single stroke action*

FOREMOST..... *with manufacturers who demand quality, simplicity and ease of operation*



MODEL "J" TYPE AUTOMATIC MICROWELD BUTT WELDER FOR NON-FERROUS WIRE AND ROD

The welding cycle on these units is automatically completed by one single downward stroke of the foot pedal, which clamps the stock being welded, contacts the welding switch, and applies the spring upset pressure on the weld.

All welders are equipped with annealing dies, filing vise, hand shears, and mounted on 4-wheel truck.

Available in four Models —

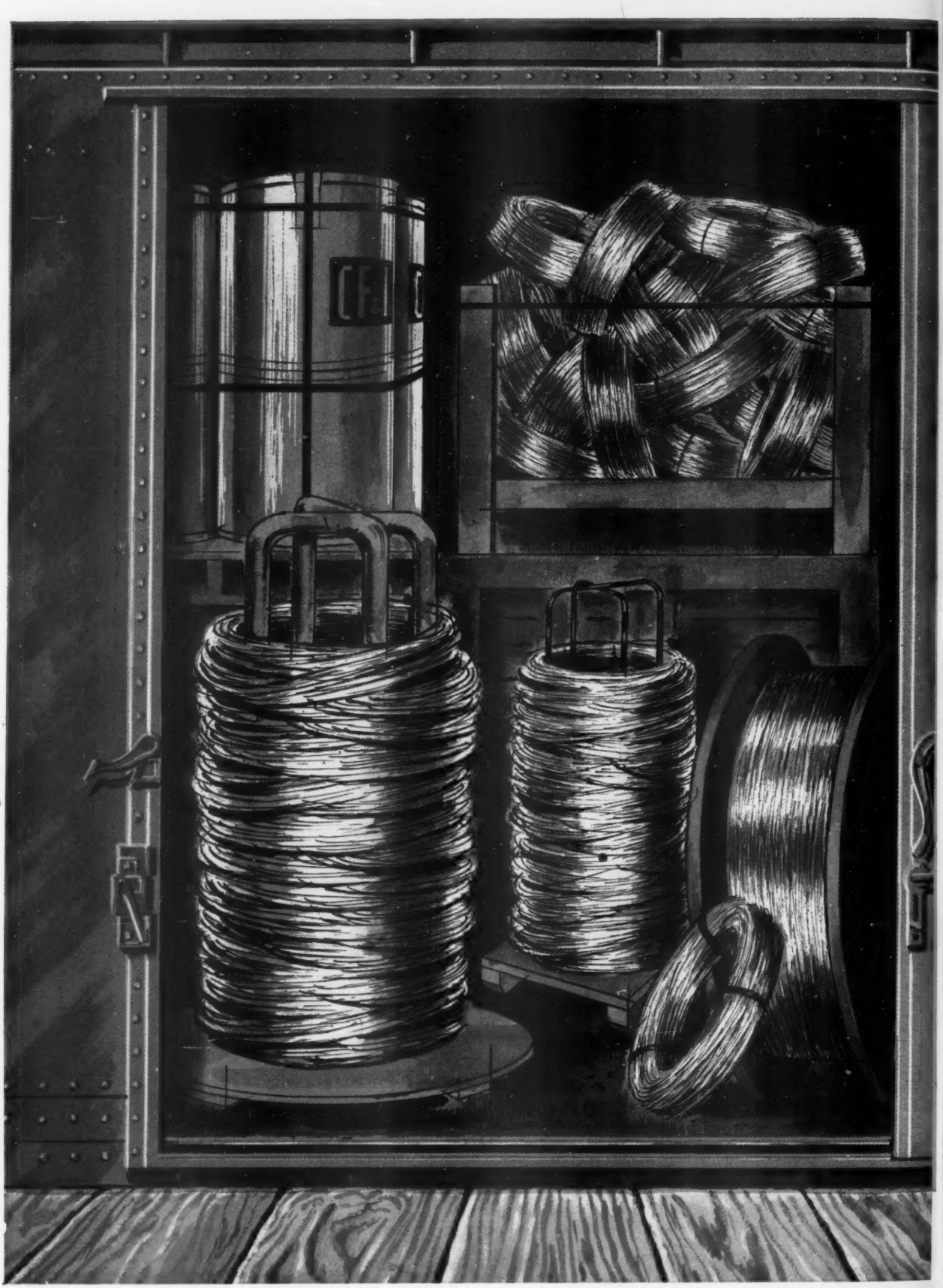
MODEL J-45-C .080" to .204" Dia.	**MODEL J-5-C** .128" to .257" Dia.
MODEL J-7-C .187" to .375" Dia.	**MODEL J-8-C** .250" to .500" Dia.

for welding Copper, Copper Alloys and E. C. Aluminum wire in sizes from .080" to .500" diameter.

MICROMETER PRECISION MICRO-WELD ®

MICRO PRODUCTS CO.

20 NO. WACKER DRIVE • CHICAGO 6, ILLINOIS • TELEPHONE STate 2-7468



ASSORTED STEEL WIRE in ONE carload... from ONE source

From Armor Wire to Zig-Zag Wire, CF&I makes steel wire to meet thousands of specifications—packages it to meet any requirement—sells it by the coil or the carload.

You can simplify your purchasing by making CF&I your *source of supply.* Whether you need one coil of just one type of wire or a mixed carload of "assorted" wires, our newly enlarged and modernized wire mills and strategically located warehouses can get it to you—fast.

We supply high or low carbon steel wire—round, flat or shaped—in a wide variety of sizes, tempers, grades and finishes — in steel-strapped or paper-wrapped coils; on spools, reels, "spiders" (holding up to a 4000-lb. continuous length of wire) or in fibre drums. Let us know your requirements.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita
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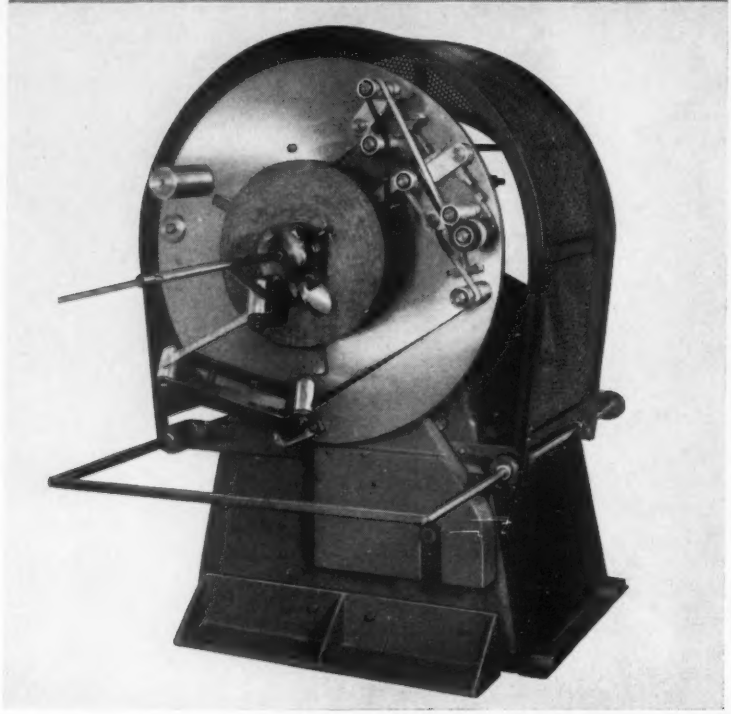
5757

NEBUTTCO

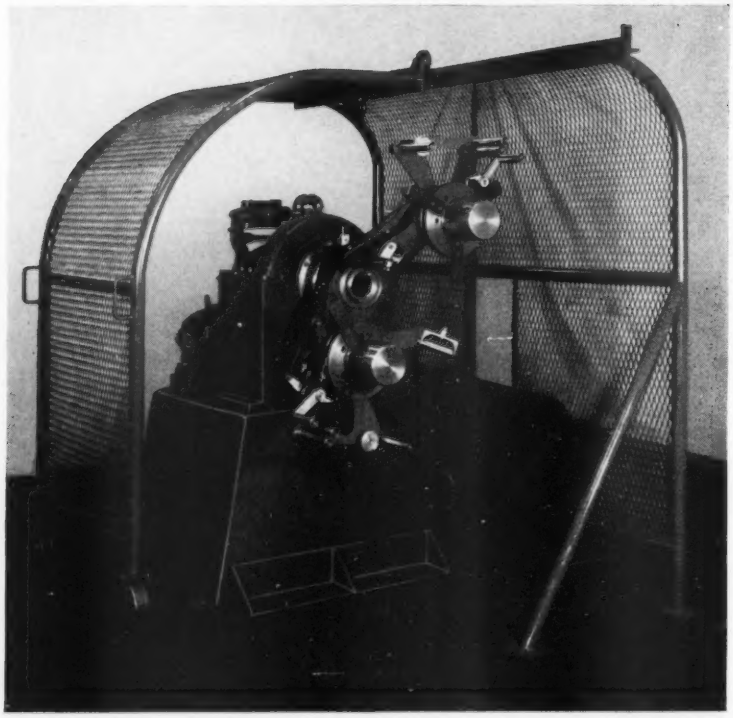
High Speed TAPING MACHINES



For Fast, Accurate Application of Paper, Cambric, Natural or Synthetic Rubber on Electric Cables.

Nebuttco High Speed Taping Machines are available in single or multiple head units equipped with motor drive, capstan and take-up. Individual units designed to operate with other types of equipment can be furnished to meet your specific requirements.

Nebuttco Concentric Machines are engineered to operate at a maximum speed of 650 RPM with tape pads 24″ diameter x 4″ wide x 6″ eye.



Nebuttco Eccentric Machines are made with from one to four tape pads. Maximum speed of 300 RPM with tape pad 20″ diameter x 4″ wide x 3½″ eye.

WRITE FOR COMPLETE DETAILS!

NEW ENGLAND BUTT CO.

DIVISION WANSKUCK COMPANY
304 PEARL STREET • PROVIDENCE 7, R. I.
In England — James Day (Machinery) Ltd.
28 Maddox Street, London, W-1
BRAIDERS • CABLERS • TAKE-UPS • BUNCHERS
STRANDERS • TAPING MACHINES

I HAD THE BOSS UP A POLE...

"He knew all about the operating advantages of polyethylene coated wire . . . but I took him up and showed him why *I* liked it and why it's saving the company even more money than he figured."

In the past 12 years polyethylene covered line wire and cable have chalked up outstanding service records for utilities. But some of the best reasons for using polyethylene coatings don't turn up in operating statistics —they come from the men whose job it is to install and maintain the lines . . . Reasons such as these:

Polyethylene Is Easier to Install

It's free stripping, yet has excellent adhesion and will not ruffle over cross arms. It's clean to work with and its surface is "slippery" too. Polyethylene coating is lighter than other types of covering . . . it handles easier.

Polyethylene Covered Line Wire Saves Outages

Polyethylene forms a complete and permanent covering over line wire. That means fewer outages from contact with trees, wind-blown swinging wires and foreign objects. Smaller diameter polyethylene coatings offer less wind resistance above ground. Lighter weight can be an advantage, too, in ice storms.

In field servicing . . . in over-all performance and service life—polyethylene has proved its superiority in wire and cable applications such as these:

- Line wire covering
- Power cable dielectric
- Tree wire covering
- GTO (Neon Sign) Cable
- Coaxial Cable
- WD-1 Infantry Field Wire
- Control cable insulation and jacket
- Communication cable insulation and sheaths
- Corrosion protection for metal sheaths.
- TV Lead Wire

U.S.I.'s extensive line of PETROTHENE Polyethylene resin compounds, specially tailored for various types of electrical insulation or jacketing and sheathing, are outlined in a new brochure, "PETROTHENE Resins for the Wire and Cable Industry." Also available is our "PETROTHENE Polyethylene . . . A Processing Guide." Write us at the address below for your copies of either or both.

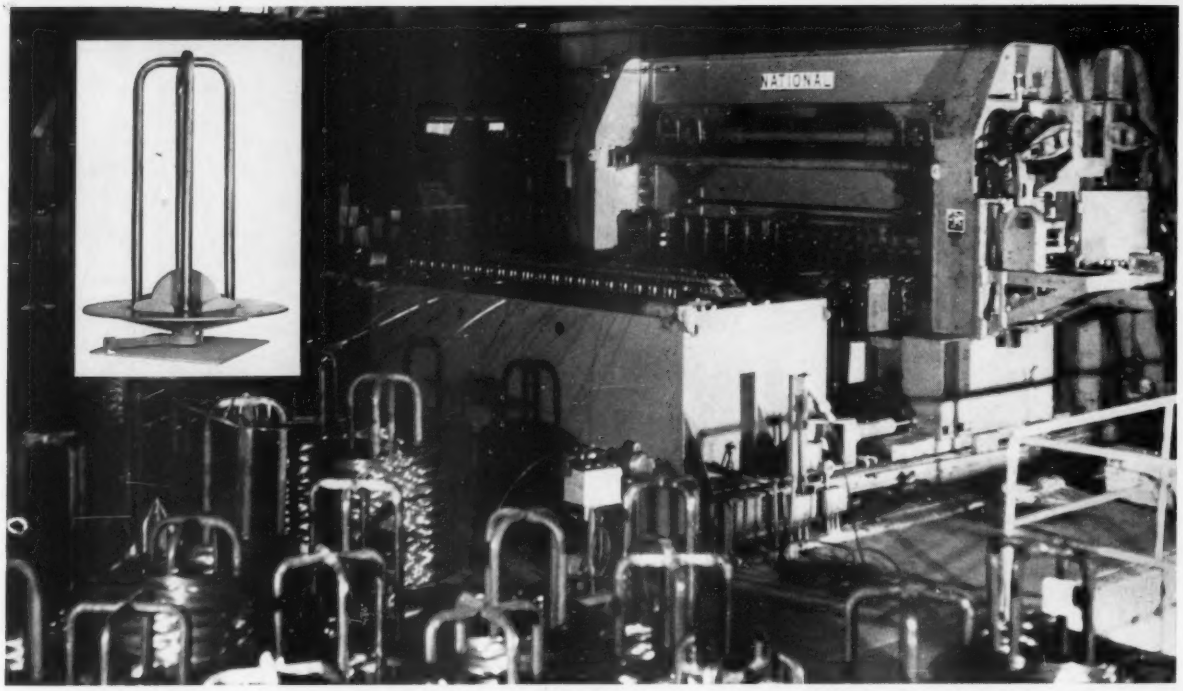
U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N. Y.
Branches in principal cities

Makers of PETROTHENE Polyethylene Resins

WORKING WONDERS WITH WIRE: down goes down-time at Continental Steel Corporation's Kokomo, Indiana Plant

...as in go **Northern Indiana Steel's high-capacity, heavy-duty**

WIRE CARRIERS and PAY-OFF REELS



THIS is the way Continental Steel Corp., Kokomo, Indiana, handles wire easily and economically. This is the way Continental and other major wire and wire fabric producers feed their giant machines with minimum interruption. These rugged, operation-proved wire carriers and reels by Northern Indiana carry up to 4,000 lbs. Stack easily, too, for space-saving storage.

WE BUILD THEM THE WAY YOU WANT THEM

In addition to the standard model shown here, we can produce units to any standard size and specification you may require. If you have a special operating problem, send us a drawing showing dimensions and other variations needed. We will quote you in the quantities specified.

NORTHERN INDIANA STEEL SUPPLY CO., INC.

Fabricating Division, Michigan City, Indiana

TELEPHONE TRiangle 4-3241

ANNOUNCING THE MERGER OF JLE THE JAMES L. ENTWISTLE COMPANY

AND FEDERAL THE FEDERAL MANUFACTURING COMPANY TO FORM

THE NEW, LARGER, MORE VERSATILE

JLE ENJACO FEDERAL

CORPORATION

THOMAS L. HOLMES
Vice President

JAMES L. ENTWISTLE
President

We are pleased to announce that, as of February 15th the James L. Entwistle Company and The Federal Manufacturing Company will be merged to form the new ENJACO CORPORATION, bringing to the Wire Industry one of the most complete and diversified lines of wire machinery and testing equipment available anywhere.

Not only will there be great variety in kind, but in price ranges as well, from the super-quality, highly-refined Entwistle specialized equipments for intricate applications, on through the economical standard-production Federal models.

With James L. Entwistle, President, in charge of engineering and production, and Thomas L. Holmes, Vice President, in charge of sales and customer service, superior quality, advanced design, fast production and efficient service are assured.

General offices and all production facilities will be consolidated in the recently completed, modern, air-conditioned James L. Entwistle factory at 100 Glen Road in Cranston, Rhode Island.

CONSULTATION ANYWHERE . . . ANY TIME . . . NO OBLIGATION

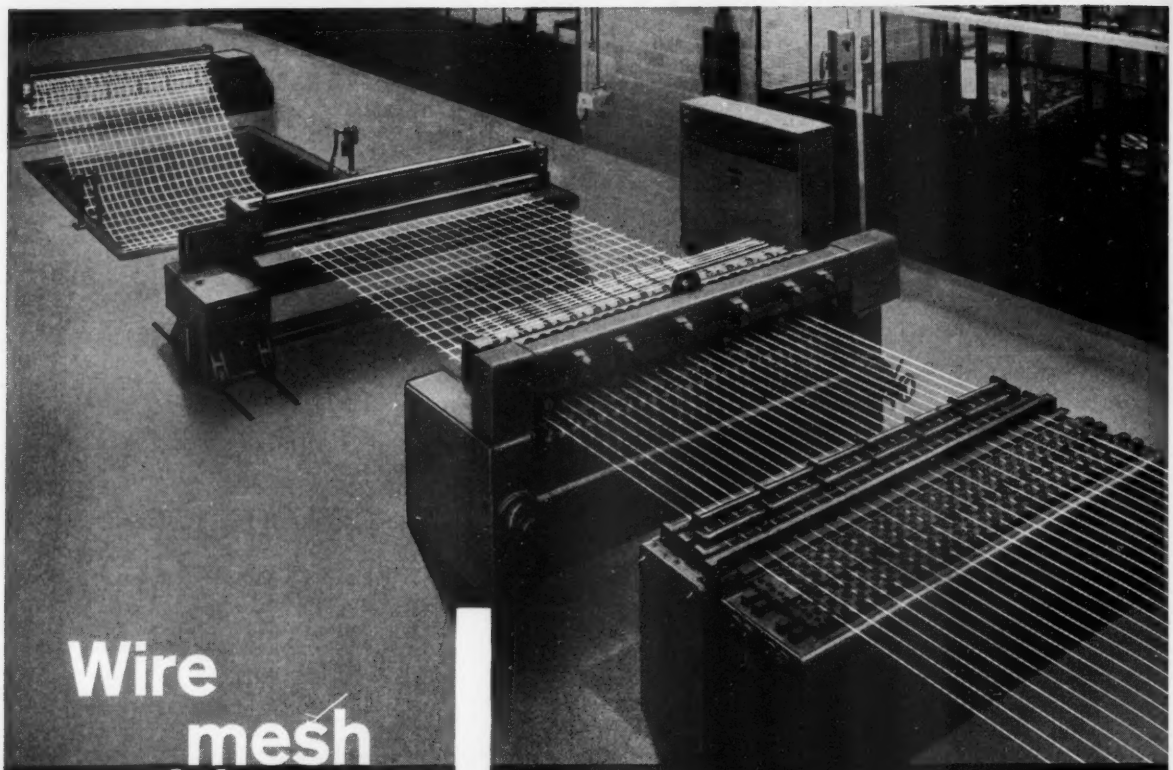
ENJACO
CORPORATION

100 Glen Road, Cranston 10, R. I., U.S.A.
Mailing Address P.O. Box 3674
Cable "JALENCO" Providence
Phone: Hopkins 7-8411

ENGLAND: *General Engineering Co. (Radcliffe) Ltd. Station Works—Bury Road Radcliffe, Lancashire, England*

WESTERN REPRESENTATIVES: *Paul I. Kenner Co. 230 Shaw Road South San Francisco, Cal.*

"A recent North American Installation"



Wire mesh welder

for the manufacture of welded fabric sheets and rolls

Advantages of the welder

Quick change from one mesh size to another.
Infinitely variable cross and longitudinal wire pitch for any mesh dimension.
Minimum wear of the large-surface electrodes by suitable electrode shape and material, as well as efficient air cooling.
Maximum power factor of the transformers as a result of minimum inductive losses.
Three-phase connection to the mains supply. Electronic current switching by IGNITRON high-power tubes avoiding current surges.
No tearing of the welded mesh and no electrode burning when feeding bent cross wires since the welder stops automatically in such a case.
Effective cushioning of the carriage impact.
Minimum maintenance and servicing thanks to permanent lubrication of all gliding and rotating parts. Automatic oil fog lubrication of all air presses.
Automatic and interlocked sequence of operations and, therefore, always minimum duration of the total welding cycle.
Electrode pressure at every welding spot and feed power are infinitely variable.
Available with attachment for welding three different and preselectable cross wire pitches.

SCHLATTER

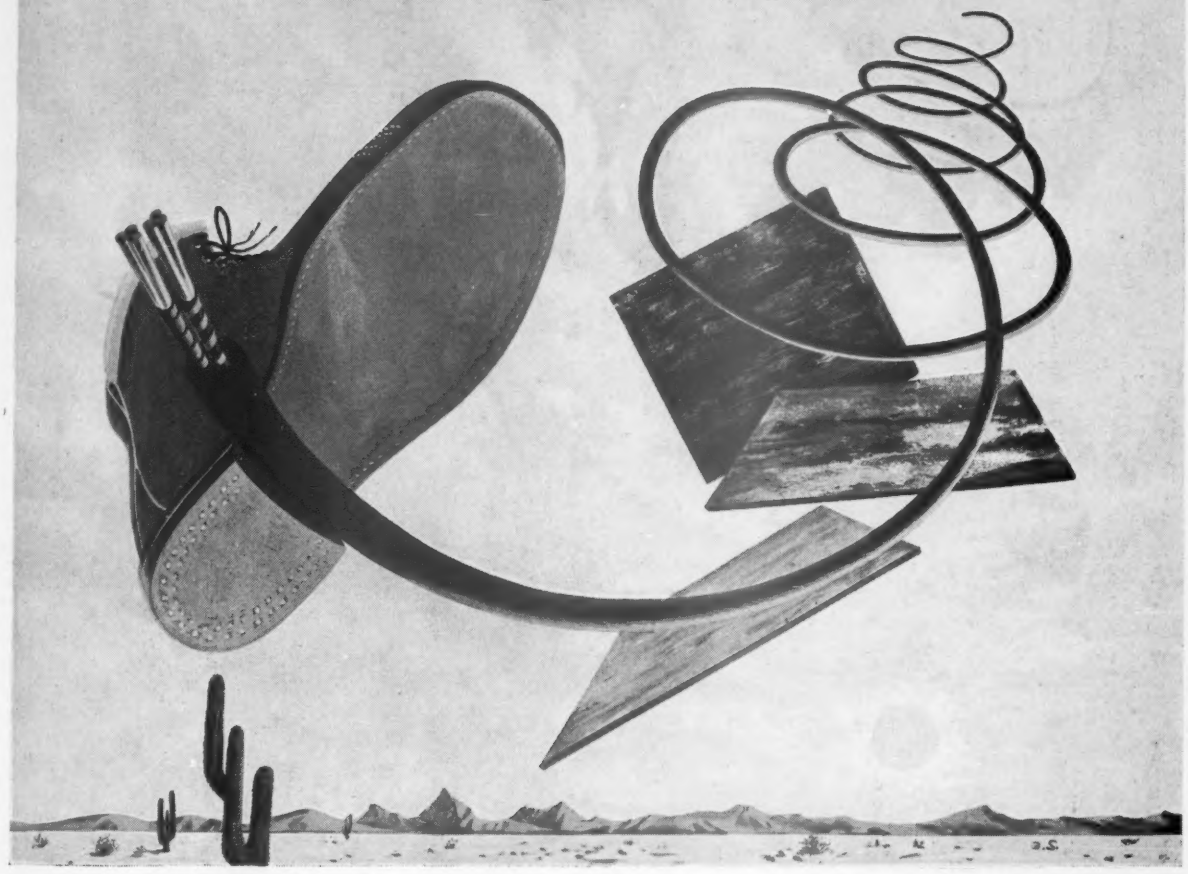
Representative for Canada and USA
P. REICHER - Machinery and Equipment
P. O. Box 127, Willowdale, Ontario, Can.

H. A. SCHLATTER LTD. ZOLLIKON/ZURICH
Manufacturers of electric welding machines (Switzerland)

NAUGAPOL K-50

SPECIALLY-PROCESSED SBR POLYMER

...a new dry rubber blend



Now a new dry rubber blend has been added to the Naugatuck line to give you a still wider choice of "wire grade" rubbers to meet your product needs.

A special masterbatch of high styrene resin and low-temperature polymerized synthetic rubber, Naugapol® K-50 offers unusually good processing characteristics together with the "dryness" and high-cured physicals for which all Naugapols are noted.

Primarily designed for use with additional butadiene-styrene copolymer—for such products as shoe soles, floor tile, and wire insulation—Naugapol K-50 is the only blend of this kind available which is suitable for wire insulation.

Try Naugapol K-50—available in pellet form—wherever you require high dielectrics, low-ash, easy processing. For detailed information on Naugapol K-50, the Naugapols generally, or still other special grades of synthetic rubber, write us today.

Naugatuck Chemical

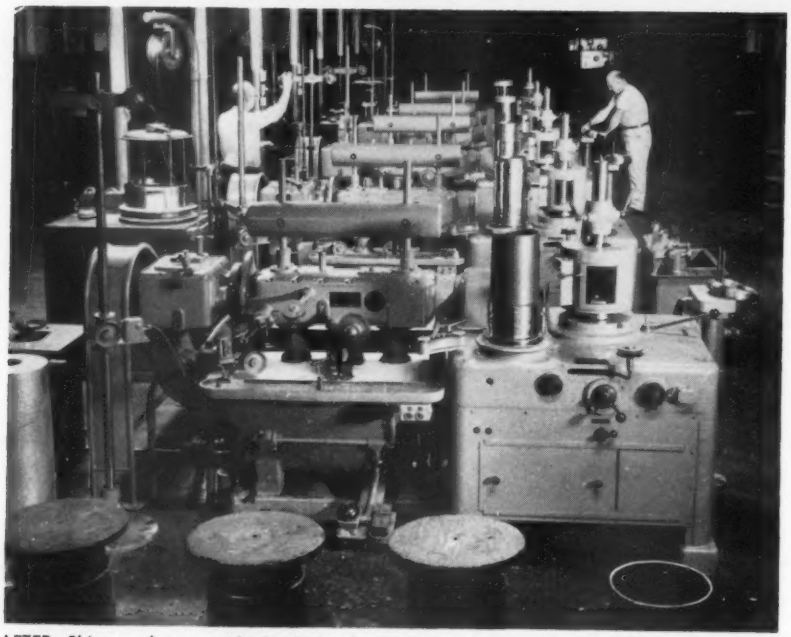
Division of United States Rubber Company

229 N Elm Street
Naugatuck, Connecticut

US RUBBER

Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario • CABLE: Rubexport, N.Y.

BEFORE: Here, wire is being drawn "the old fashioned way."



AFTER: Shiny and new, with the look of tomorrow, the new wire drawing equipment at Prentiss produces wire better and faster.

NEW WIRE MACHINES UP PRENTISS OUTPUT

Five new wire drawing machines have been installed at Prentiss Wire Mills, Riverside-Alloy Metal Division, according to J. R. Fuller, manager of Prentiss. The new high-speed equipment has replaced ten rows of antiquated single hole tub drawing benches.

The new wire drawing machines are now in production and have drawn wire down to .008 inches diameter, only slightly thicker than a human hair, maintaining extremely close tolerances. They will be used to draw all types of wire including non-ferrous alloys and high and low carbon steels.

After drawing, the machines automatically wind finished wire on spools or cores with capacities from 10 to 60 pounds, or in coils. Increased spool capacity pays off for customers by permitting longer uninterrupted production runs.

A number of new specialty wire products are now practical with the precision, high-speed equipment which constitutes the latest step in the continuous modernization of Prentiss Wire Mills.

"PRENTISS" adds "HERBORN" Wire Drawing Machines To Their Line

"HERBORN" TF IIIc Wire Drawing Machines photographed at the plant of Prentiss Wire Mills, Riverside Metal Alloy Division, H. K. Porter Company, Inc., at Holyoke, Massachusetts. * Photos and text courtesy "Re:Porter," published monthly by H. K. Porter Company, Inc.

KO CO., INC
INDUSTRIAL IMPORTERS

MASCHINENFABRIK HERBORN, BERKENHOFF & DREBES A.-G.
HERBORN/DILLKREIS, GERMANY
Sole Representative in the U.S.A.:
KURT ORBAN CO., 34 Exchange Place, Jersey City 2, N. J.

Memo to a Man of "Parts"

The number of different parts made from Roebling High Carbon Specialties, Flat Wire and Spring Steel are close to countless.

Some things you can count on, though, are the consistent dimensional and mechanical uniformity you get with any Roebling High Carbon Specialty. They are the qualities that contribute to speeding *your* production and cutting *your* costs.

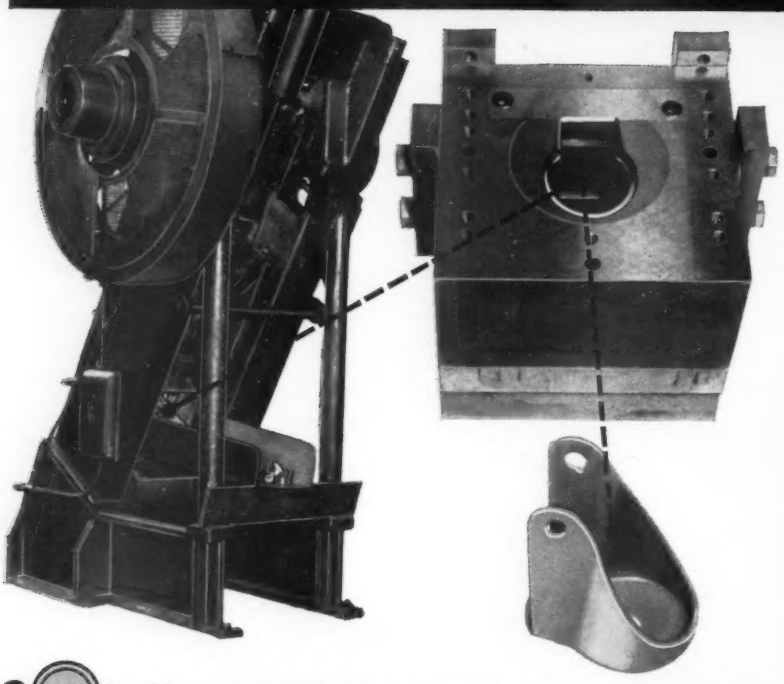
They are high qualities that make for high values. Next time you need flat wire or spring steel, specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

Talide® DIE IN SERVICE 8 YEARS DRAWS 9,000,000 CASTER PARTS!



Bassick Company, Bridgeport, Connecticut, leading producer of casters, chair controls, automobile and specialty hardware, was experiencing difficulty drawing an eccentric shaped chair caster part from commercial quality hot rolled drawing steel.

Scrap rate was high—production per die low. The high-speed steel die being used (costing $350.00) had to be reground and polished every 30,000 pieces, and replaced several times a year.

A Grade C-85 Talide die (costing $1100.00) was installed in 1950 and to date has produced over 9,000,000 caster parts. During this 8-year production run, the Talide die has required no servicing and is still in operation.

Bassick Company engineers report that the quality of their product has been improved. Surface marks and scratches, caused by scoring and galling of the steel dies previously used, have been completely eliminated.

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

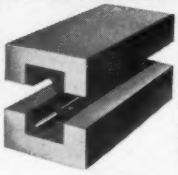
A Talide die engineer can help you cut costs and increase production on draw presses, punch presses, pill presses, cold headers, swagers and draw benches.

METAL CARBIDES CORPORATION
6001 Southern Boulevard Youngstown 12, Ohio

Send for 76-Page Catalog 56-G

WIRE DIES

Hundreds of miles of steel and non-ferrous wire—.004 to .750—drawn through TALIDE dies.



SWAGING DIES

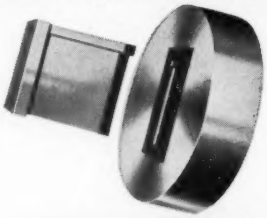
Leading fountain pen manufacturer cold swages 33 times more stainless steel parts with TALIDE dies.

HEADING AND EXTRUSION DIES

Cold heading ¼" C-1008 rivets, TALIDE dies produced 11,200,000 pieces, other carbide dies only 3,500,000.

CURLING ROLLERS

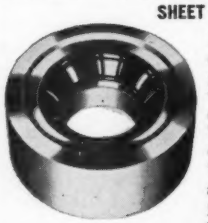
TALIDE curling rolls last 65 times longer than steel rolls on beverage can forming operation.



BLANKING AND FORMING DIES

70 times more paper discs blanked out with TALIDE—over hard alloy die.

SHEET METAL DIES



137,000 hi-alloy steel pressure vessels drawn with TALIDE against only 7,900 with steel dies previously used.

POWDERED METALLURGY DIES

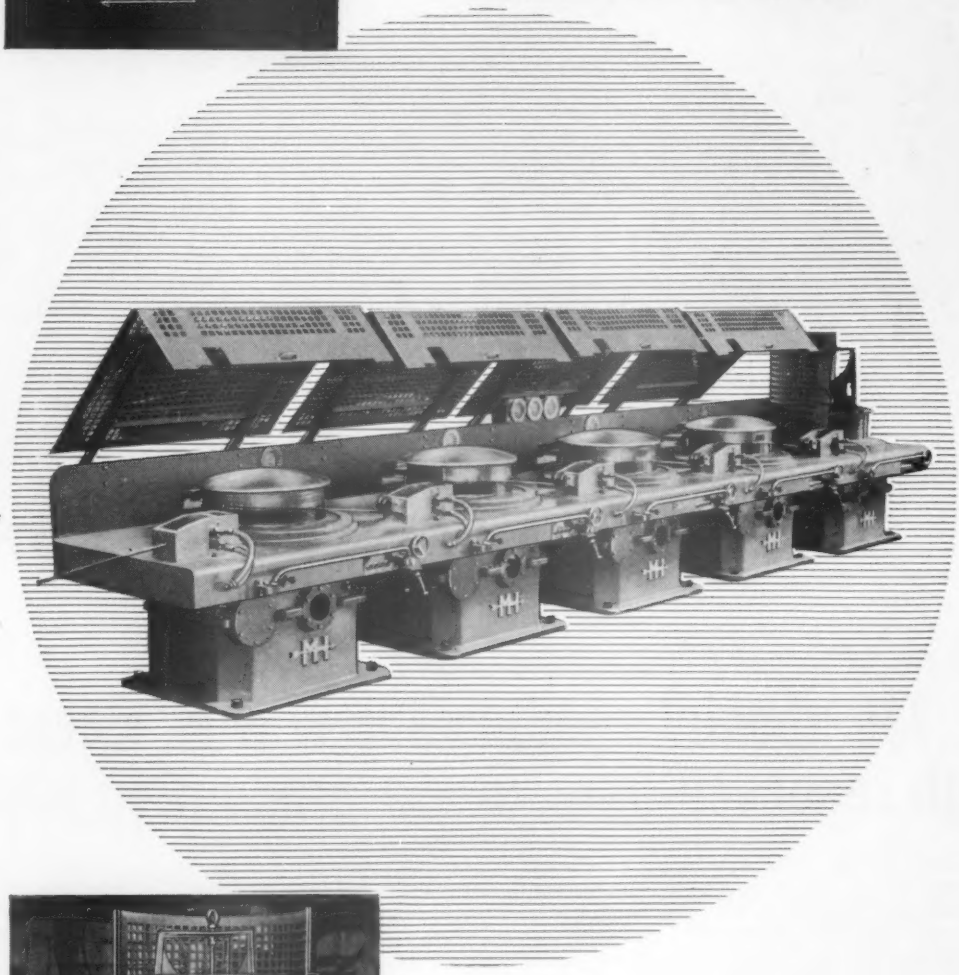
Compacting highly abrasive chemical powders, TALIDE pill dies last 4 months; steel dies wore out in 6 hours.

Three sizes for all types
of material
Optional number of blocks

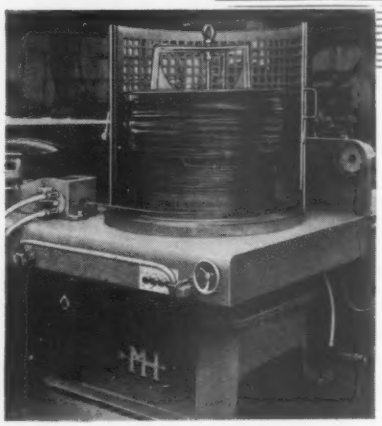
Our experience in building
wire drawing equipments
during 60 years
is your guarantee

THE BEELINE

**Designed and built to meet
today's requirements for trouble-free
high production wire drawing**



*The heavy size:
BEELINE DG-5
with five 28" blocks
for
PRESTRESSED
CONCRETE
max. about
.55" rod.*



Easy "casting" control

MORGÅRDSHAMMAR

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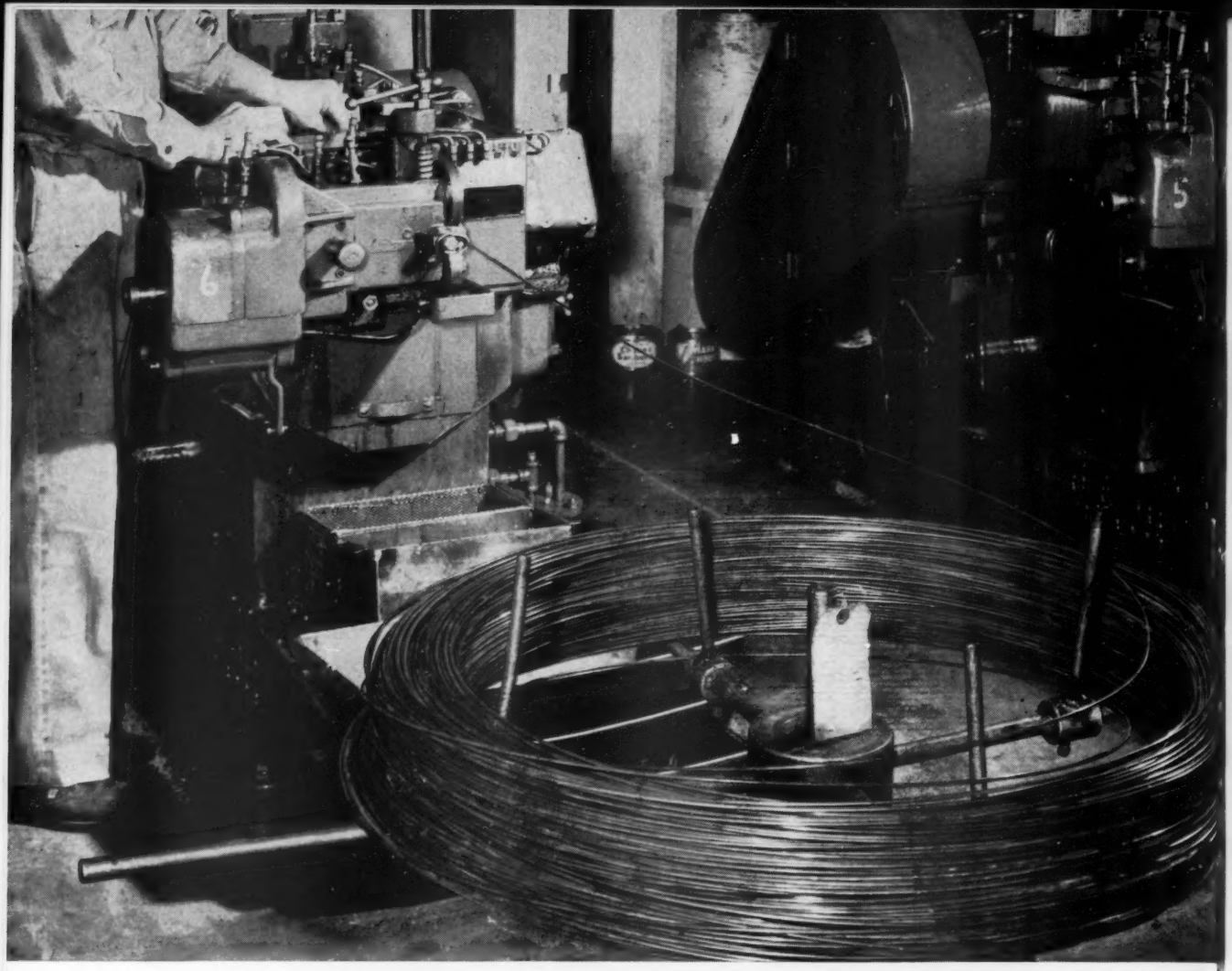
**MH. MACHINES
19002 LOMOND BLVD.
CLEVELAND 22, OHIO
TELEPHONE: WYoming 1-5830**



The high degree of plasticity of J&L special heading screw wire and its freedom from surface defects have virtually eliminated splitting problems for Midland Screw Corp.

At Midland Screw Corporation

J&L special heading screw wire solves tough recessed-head screw production problem

Midland Screw Corp. of Chicago, at its Millersport, Ohio, plant has found J&L special heading screw wire "... a consistently high quality product that we can depend upon."

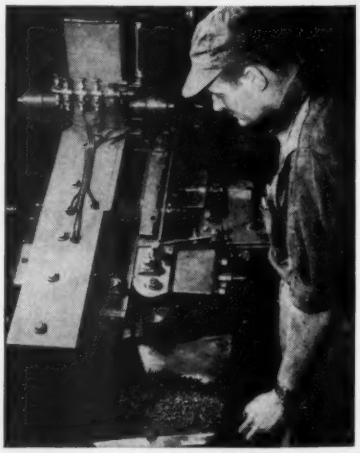
Midland makes 4,500 kinds of screws, all to very close tolerances. The recessed-head types include round heads, oval heads, pan, flat heads, truss heads and others.

Recessed-head screws are tough to make because of the extraordinary demands on the steel wire during multiple heading operations. The wire must have a high degree of hardness. And, *after* it has become even harder from the initial cold heading blows, it must have enough plasticity to take the final indent.

The wire must be free from harmful surface defects. Since the pressures involved alone are sufficient to cause serious splitting with ordinary heading wire, any seaminess can accentuate this problem.

Midland also uses J&L special heading screw wire for other screws with heads that are difficult to form. One of these, made from .133-inch wire, is an indented hexagonal washer head. The washer on the finished screw is .370 inch—or almost three times the diameter of the wire.

For more information on J&L special heading screw wire, call your J&L representative. Or write to Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa.



Midland makes recessed-head screws at rates up to 13,800 per hour on each machine by using J&L special heading screw wire.

The exciting new J&L

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

If you use SHAPED STOCK a

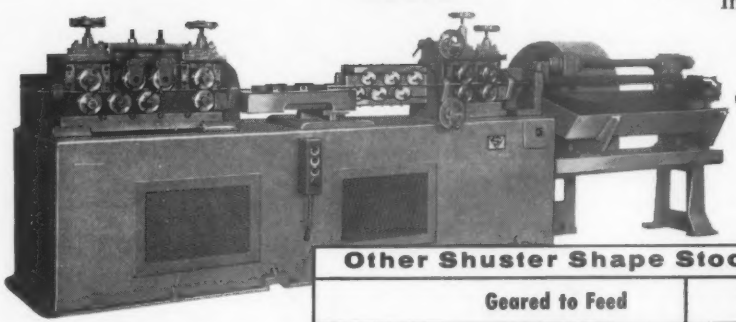
SHUSTER

Shape Stock Straightening and Cutting Machine

Gives It To You Straight!

SHUSTER, the nation's oldest name in wire straightening and cutting, now offers a *complete* line of shape stock machines — first in the field again! For manufacturers of electric motors, wrought iron furniture, and wherever shape stock in volume is needed, SHUSTER offers the economical answer to accurate, straight, square cut stock.

3AVF



Capacity: to 3/8" square, or 3/4" width. Infinite variable speed drive — geared to feed *76* to *228* *feet per minute*. Solenoid operated roll-type clutch — electrically controlled cut-off.

Other Shuster Shape Stock Straighteners

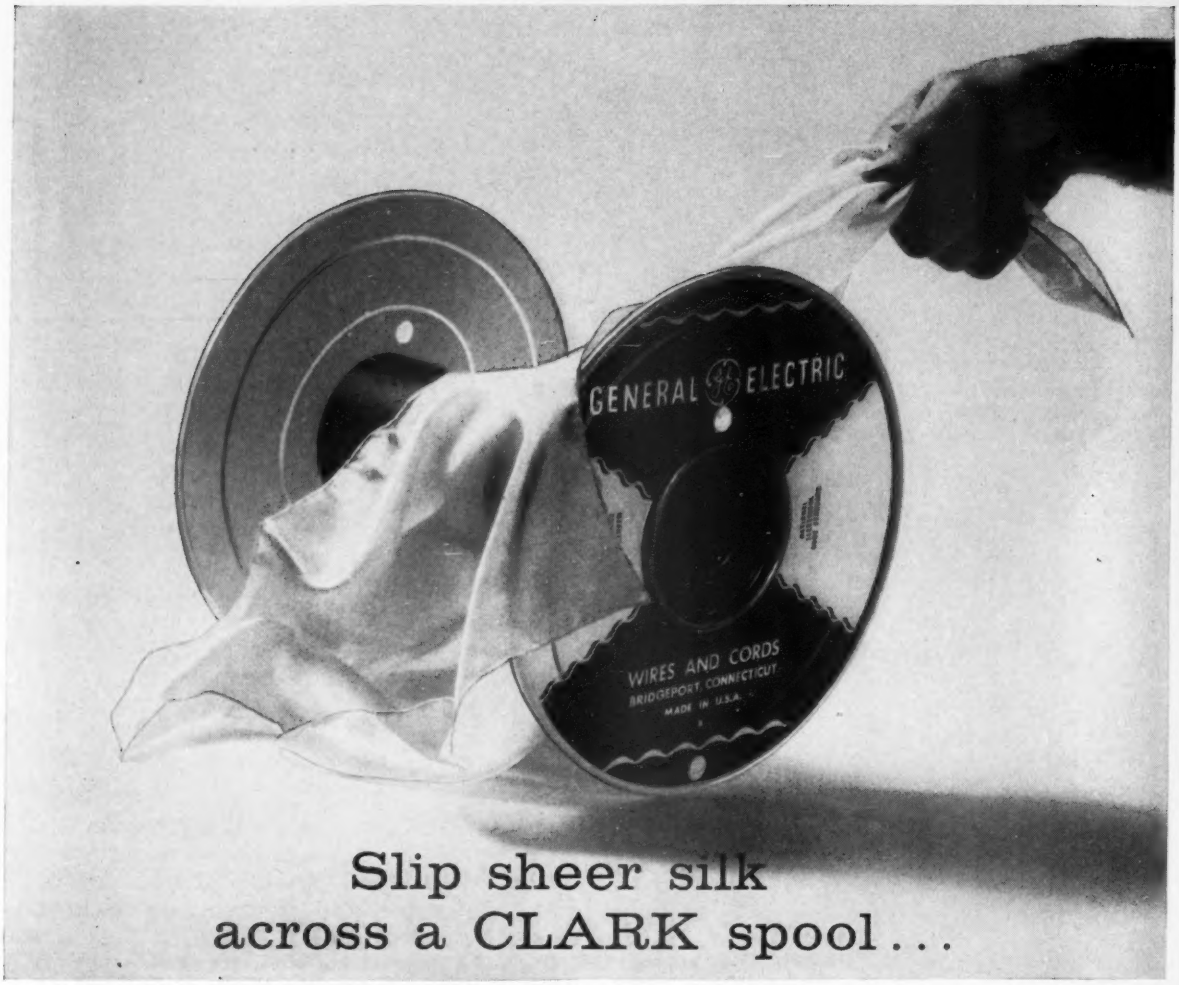
	Geared to Feed	Square	Max. Width
1AF	150 FPM	1/8"	1/4"
1AVF	50-200 FPM	1/8"	1/4"
2AF	150 FPM	3/16"	3/8"
2ABF	150 FPM	1/4"	5/8"

Write today for complete details!

METTLER

MACHINE TOOL, INC.

155 West Adeline Street, New Haven, Conn.



Slip sheer silk across a CLARK spool . . .

no snagging burrs, safe for hands and wire

Smooth, rounded edges of Clark wire spools eliminate any possibility of injury to hands or your product. Safety is one of the *many plus features* you get from J. L. Clark's superior spool technology.

Clark reinforces the strength of steel with locked-seam construction and a continuous bond between barrel and head which totally prevents independent turning of end, cap or center.

Select from a wide range of standard end diameters—or let Clark solve your special problem for any type of insulated or fine wire spool.

Your established design can be faithfully reproduced—or we will create a new one for you.

Sales-winning lithography by Clark—brilliant, critically accurate—establishes instant recognition for your brand.

Aren't these reasons why you should check on Clark's wholly integrated spool service? For complete details, ask for our booklet, "Spools for Insulated Wire." *J. L. Clark Manufacturing Co., Rockford, Illinois; Liberty Division Plant and Sales, Lancaster, Pa.; New York Sales Office, Chrysler Bldg., New York 17.*

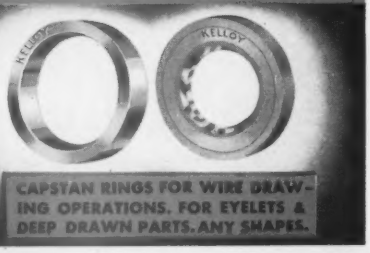
lithographed metal containers

J. L. CLARK

FOR PRECISION AND ACCURACY

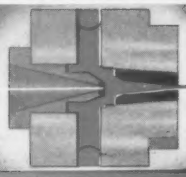
Specify "KELLOY" CARBIDE SHAPE DIES

WEAR RESISTANT PARTS. BUSHINGS, GUIDES, CRIMPING, EDGING AND COATING DIES, etc.

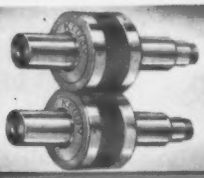


CAPSTAN RINGS FOR WIRE DRAWING OPERATIONS. FOR EYELETS & DEEP DRAWN PARTS. ANY SHAPES.

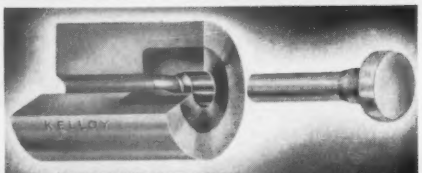
NON-FERROUS SHAVING DIES



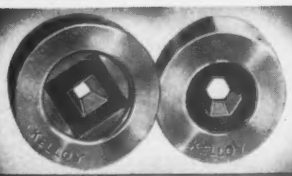
SELF ALIGNMENT PRECISION HEAD & EXTRUDING TOOLS FOR EXCHANGE CABLE INSULATING



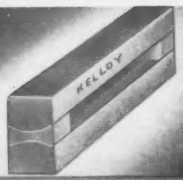
WIRE FLATTENING ROLLS. TRUE SURFACE FOR HIGH QUALITY FLAT WIRE.



BOLT SIZING DIES. COMPLETE AND READY TO USE. CLOSE TOLERANCES.



SHAPE DIES WITH SHARP TRUE CORNERS FOR ACCURATE PRODUCTION.



SIDE AND END BLOCKS. COLLAPSIBLE DIES FOR DRAWING BAR STOCK.

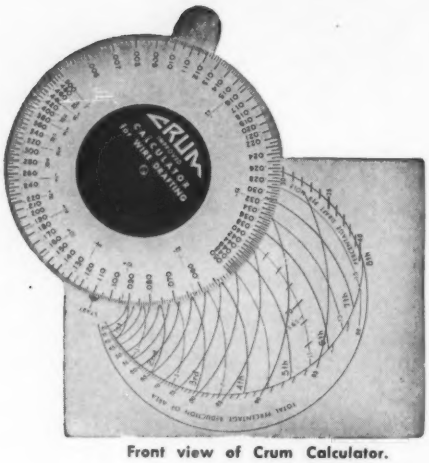
KELLOY CORPORATION
17 WEST 34th. STREET NEW YORK 1, N. Y.

AVE SET-UP TIME WITH THE . . .

CRUM CALCULATOR

FOR WIRE DRAFTING

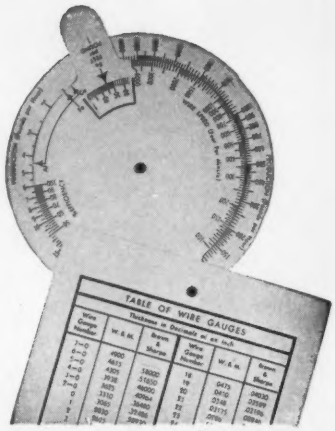
Useful and Accurate!



Front view of Crum Calculator.

THIS NEW DOUBLE-PURPOSE CALCULATOR WILL:

1. Provide quicker and more accurate information on die sizes and reduction areas;
2. Calculate wire production rates for various speeds and efficiencies.



Reverse view of Crum Calculator.

SOME OTHER FEATURES OF THE CALCULATOR

- Has new scale for more accurate determination of small percentages.
- Gives readings in B & S gauges.
- Intermediate lines provide reductions for 16 holes in one setting.
- New rectangular shaped back for better protection of calculator.
- More legible % draft-per-hole scale.
- Vinyl plastic construction, resistant to wear, warping, dirt, perspiration, wire drawing soaps—can be cleaned.
- Still fits your vest pocket.
- Handy tables of W & M and B & S gauges.
- Feet per pound calculating scale for steel, copper and aluminum wires.
- Durable, accurate, easy to use.

The improved Crum Calculator is worth its weight in gold in time saving —no laborious mathematical calculations necessary when you use it. Instruction sheet with examples accompany each Calculator. You should have one or more in your wire drawing department.

THE PRICE: $5.00 EACH

Send your orders to:

WIRE AND WIRE PRODUCTS

453 MAIN STREET **STAMFORD, CONN.**

(Exclusive distributors)

SWIFT'S FLEXAL 2

Swift Development opens up New Opportunities for ANTI-FRICTION ACTION

Flexal² represents a family of "light" metallic stearates which were developed specifically to provide the metal processing industry with a highly heat resistant, water insoluble* processing lubricant.

They have exhibited excellent, effective and economical service life as anti-friction agents, are extremely uniform in composition and highly stable in storage and in use. Their versatility makes The Flexal² family highly adaptable to specific processing requirements.

Why not look over the general specifications with *your specific process* in mind? Our success with this dramatic new family may open a new avenue of ANTI-FRICTION ACTION for *you*. Write for details: SWIFT & COMPANY, Soap Dept., 4115 Packers Ave., Chicago 9, Ill.

To Serve Your Industry Better

Swift 104TH YEAR

GENERAL PROPERTIES

FLEXAL S
Hot dip, dry film lubricant and rich dry drawing compound.

FLEXAL MCL
Lean, fine, dry lubricant for low carbon bright and cold heading wires.

FLEXAL MCA
Metallic stearate base. Medium veri-grind compound.

FLEXAL MCF
Metallic stearate base, rich fine mesh drawing compound.

FLEXAL CS
A pure calcium stearate, 58°—60° C. titer, 325 mesh (max.).

FREDDIE FLEXAL invites your further inquiry.

S-48MR

*Flexals can be either soluble or insoluble in water or solvents, depending upon need.

Burroughs' Unique Tests and Johnson Wire Build Quality, Long Life in Business Machines

Detroit Plant Develops Own Devices For 100% Tests of Music Wire Springs

Burroughs Corporation demands music spring wire as thin as a spider web's strand but with a minimum tensile strength of 439,000 pounds per square inch.

Then—to make sure it gets what it orders—the Detroit business machine manufacturer does 100 percent testing of all wire coming into its plants. Burroughs goes further than standard test equipment would permit and has developed its own special testing devices.

Burroughs' insistence on enforcing specifications is the kind of qua challenge on which Johnson Ste Wire Company thrives. A custom emphasis on quality wire com ments Johnson's own skill and given to producing the best specialty fine wires.

Johnson Steel & Wire has come Burroughs' major mu spring wire supplier beca Johnson's wire passes 100 p cent inspection with flying colo

At Burroughs, where a mont production of 3½ million preci springs of music wire is not unus close attention must be given everything affecting performanc the finished spring. Failure of e the simplest spring could disable adding machine, cash register, culator or any of the dozens of ferent business machines Burrou makes.

For its new machines, as wel service parts for older models, B roughs makes 1,300 different ki of springs. Music wire required them ranges from .005-inches diameter (with minimum ten strength of 426,000 psi) to largest diameter used—.106 inc in diameter, (with a minimum t sile of 268,000 psi).

Here's what Burroughs wa from music spring wire, in addi to tensile strength:

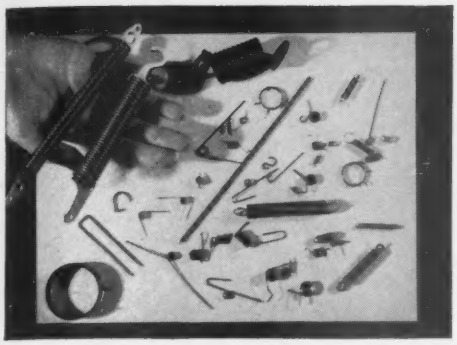
The coating, in the case of coated music spring wire, must uniform and adherent to elimi peeling, cracking or flaking du coiling.

• **High physical qualities,** form cast and smooth, lustr surfaces are another must so t uniform springs, within dimens and capable of carrying assig loads, can be produced.

• **Accuracy of dimensions** gre affects spring coiling and spring formance. Burroughs' tolerance sp ifications are met consistently Johnson's wire.

• **Straightness requirements** pre-straightened wire call fo three-foot length of wire cut fro

Precision springs, made from Johnson Steel & Wire Company's music spring wire, get 100 percent testing on unique testing machines like this. Designed and built by Burroughs, this machine verifies a spring's load-carrying capacity at various extensions. If any modification is needed, correction can be made while spring is still on test device.



Here's some of the approximately 1,300 different kinds of springs which Burroughs Corporation manufactures from Johnson Steel's music spring wire.

coil to be straight within 4 inches for .013-inch diameter wire and straight within 3 inches for wire .014-inch diameter and larger.

• **Coilability** is assured in the music spring wire Burroughs buys. Burroughs specifies that wire (.105 inch in diameter and smaller) must meet this test:

Wire is wound in a tightly closed spring to a coil length of 5 inches on an arbor 3 to 3½ times the diameter of the wire. When this spring is stretched so that it sets to 3 times its original length, the coils must show a uniform pitch with no splits or fractures in the wire.

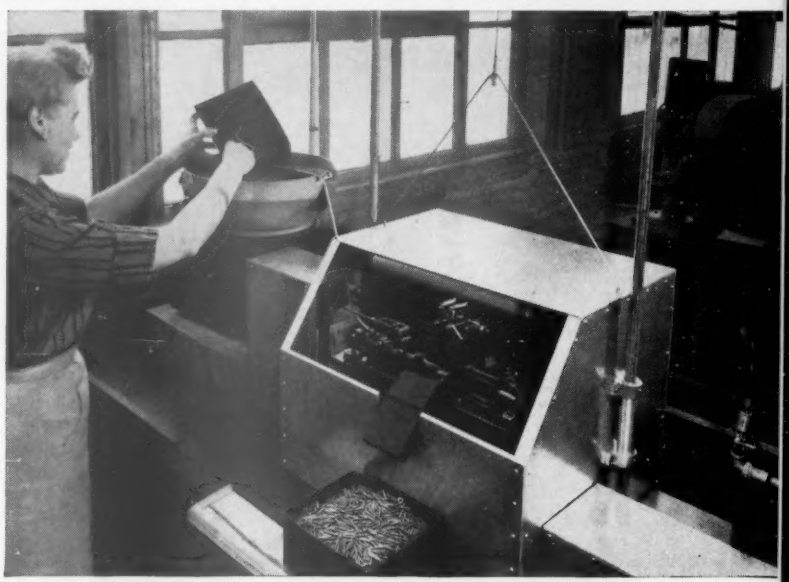
Testing completes the cycle which calls for highly skilled technicians coiling the best music spring wire available on the most modern equipment.

Testing machines, designed and built by Burroughs and used in addition to the standard machines, include the test fixture pictured here. This machine tests load-carrying capacity of springs. If any corrections are needed, they can be made while the spring is still on the test device.

Burroughs' careful attention to specs, its quality control and its testing procedure—plus its confidence in Johnson's music spring wire—are proof that Johnson can meet the toughest music wire demands.

Putting Johnson's music spring wire on your production lines starts benefiting you immediately. A corps of skilled wire engineers is as close as your telephone. Get in touch today with any of the district sales offices listed at right.

Several hundred music wire springs have been installed in this portable Burroughs adding machine. Every spring is critical, says Burroughs, because even the smallest spring failure could disable the machine.



This automatic spring eye-forming machine was designed and built by Burroughs personnel. An operator is shown filling the hopper with coiled springs which will be given an eye at each end on this device.

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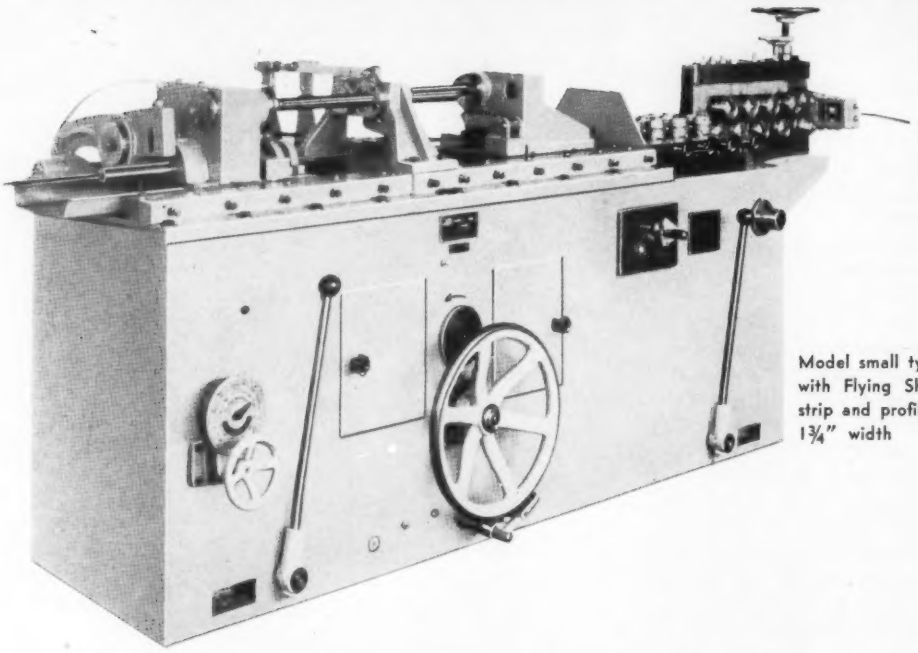

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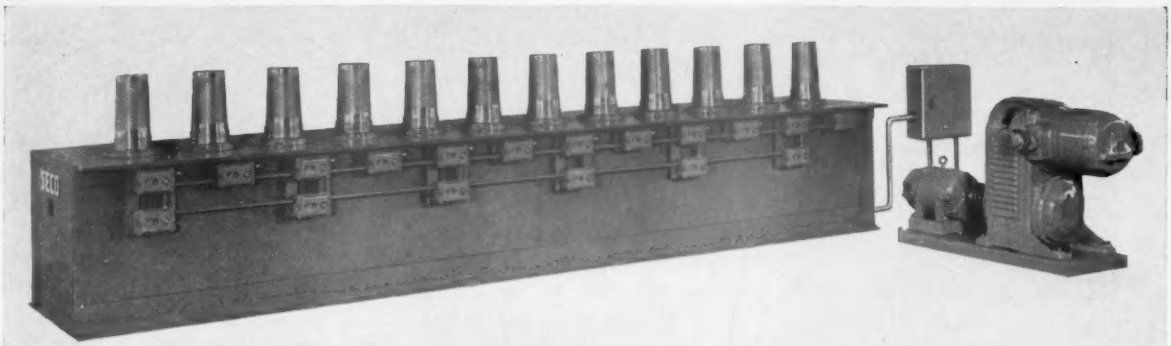

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This gives simultaneous speed changes to all spindle blocks, in ratios up to 5:1 or even 10:1 or higher. It provides push-button stop-start control to each of the gear motors driving each spindle block. Gone is the old bevel gearing, with manually operated clutches for starting and stopping the blocks.

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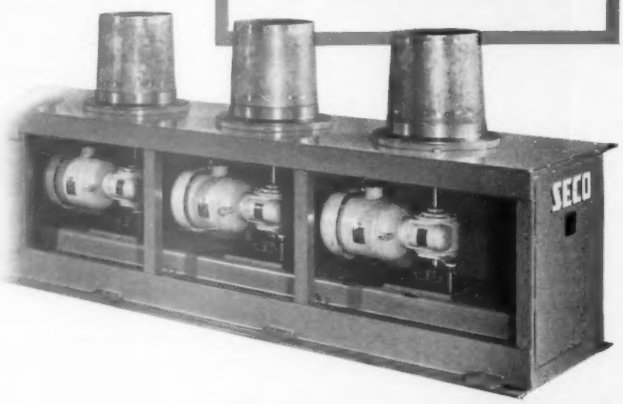
SECO Take-Up Frame and VARIDYNE Electrical Power Unit which provides synchronized variable speed to the multiple drives. AC current is employed throughout, and the VARIDYNE System "gears" all the drives together by electrical impulses.

SHOWN BELOW:
The AC squirrel-cage induction type gear motors which drive the spindle blocks through hollow bored shafts.



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The Wire Outlook

The major economic worries of the day are unemployment, government spending, inflation and federal legislation.

Toward the close of the year unemployment stood at 4 million, but is expected to increase somewhat in the first quarter in spite of improving business. Management has had to economize to offset higher wages and is finding ways to produce more goods with fewer men.

The new Congress is spending-minded. While the President is calling for retrenchment and a balanced budget, it is stated that the cuts he has requested do not go deep enough. Farm supports will remain, veterans will continue to get benefits, foreign aid will be carried on and arms spending will rise somewhat. Where we need basic cuts are in bureaucratic squandering; for example, farm and veteran benefits.

While there are signs that inflation has halted for the moment, the pressure on the economy for ever-increasing wages and ever-high government expenditures will make itself felt later inevitably.

As to legislation, there are certain to be new labor and tax laws, but it is very doubtful that the new laws will be all that circumstances require. Possibly all that can be hoped for is that some progress will be made.

Business is entering the new year in a strong position. New car sales are fairly satisfactory, steel demand is high, goods are selling well in most lines and corporate earnings show indication of improvement.

Construction contracts rose to a new high last year and should at least maintain that level this year. Highways and housing account for most of the gains. Factory, office building and other business building projects are down and will remain low. New plant construction was hit hardest in 1958 and is the one most likely to rise first. Consumer spending, now strong, may accelerate in volume this year. Individuals will have $16 billion more to spend or save in 1959. Competition will be more intense than ever and imports will probably rise this year. While the idea of free-trade, which we are gradually approaching—duty reductions of from 10 to 20% are reportedly being made—is fine in theory, imported products are posing a very real problem for both labor and management in the wire industry. It is not difficult to see why domestic producers have cause for concern when one notes wage scales abroad. Against our average hourly wage rate of $2.67 in the steel industry, the rate in Japan is 39 cents, 59 cents in Germany, and 69 cents in Belgium.

Last Fall the import volume brought about a plea by four American steel firms for some tariff adjustment on nails, barbed wire and galvanized fencing on the ground that imports were threatening serious injury to domestic industry. Remedy was rejected and a suit has been started to require the Tariff Commission to make an investigation under Section 7 of the Trade Agreements Extension Act, the "escape clause." That imports are a problem is reflected in the fact that practically every issue of the publications serving the metals industry contains some reference to the subject and the big-city dailies carry frequent items on it.

On the electrical manufacturing side of the industry, it is anticipated that 21 billion dollars worth of equipment will be made in 1959—up 7% over 1958. The electric wire and cable industry—vitally interested in this—looks for a gain of 8% in production. It reported sales of $1.3 billions in 1958.

The wire end of the steel industry is spotty. Some producers are operating at near capacity, while others are just holding on. Manufacturers' wire has shown further slight improvement and upholstery wire is said to be doing well. Automotive buying and road building account for some of the increased wire activity. Merchant wire is seasonally slow, although some orders for spring deliveries are being received now.

The national birth rate is something to keep an eye on. We have now a population of 175 million. By 1960 there will be 3 million more. In ten years it may stand at 208 million. New households should average 880,000 to 1960, then jump to more than a million each year to 1970. Industry will soon outgrow its ability to serve this growing market unless it expands.

Edmund Duval Sickels
EDITOR

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Vol. 34 FEBRUARY, 1959 No. 2

Symposium on Electrical Testing

October 14, 1958

This Symposium was comprised of six papers, following which is a summary of the recorded discussions.

MODERATOR

Alexander A. Kerr

Superintendent of Production

Electrical Wire Division

John A. Roebling's Sons Corporation

Trenton, New Jersey

An Analysis of Spark Testing Systems

by Joseph E. Byrnes

Wire and Cable Department

General Electric Company

Bridgeport, Connecticut

This paper, a part of the Symposium on Electrical Testing, was presented at the Annual Convention of The Wire Association in Atlantic City on October 14, 1958.

How often have you been involved in a discussion on spark testers, or were in the process of purchasing new equipment requiring a spark-tester, and the following questions were asked:

★ ★ ★

Should a bead chain or water electrode be used? Can the sensitivity of the fault detector be improved? Does the voltmeter register the actual applied potential? What about spark potentials, wave form, length of the electrode, etc.? Generally, an interesting discussion develops with the result we end up purchasing a unit similar to earlier models, without obtaining any answers to the above questions. At this time I would like to re-open the discussion to attempt an analysis of each point.

The Electrode

The bead chain has been the standard for years, but recently wet sponge or water electrodes have entered the picture. Is one superior to the other? In an attempt to make an approach to this question, a sparker was arranged with inter-changeable electrodes to determine if the charging current to the wire increased when using one versus the other. The result of a series of tests indicated a 25% increase in charging current with water versus the bead chain, which indicates the bead chain does not provide a uniform electrode and

offers the possibility of missing faults. The only conclusive test to a final analysis rests in comparative factory tests. The water electrode must be provided with a means of drying the wire at the exit end or false tripping may result due to surface leakage. The surface leakage in the above test ran as high as 30%.

Fault Detector

In the past few years, sparker manufacturers have expended a great deal of time on current limit devices in order to improve safety factor. This is commendable and desirous, but the ultimate use of the instrument is to detect faults. The fault systems differ, but generally speaking, a relay or two is provided in the transformer secondary ground path, and are tripped by increasing current when a fault occurs. The amount of current required to trip the relay is the same regardless of the size wire under test. The percentage change in charging current to relay trip current is usually several hundred percent. An improvement in this area would be the development of a relay with variable sensitivity, permitting an operator to adjust the trip point. The lowest trip point is not, unfortunately, established by the wire charging current, but is also affected by the distance between the electrode and sparker transformer. Why is this? Neon sign cable or equivalent is utilized in inter-connecting the two units. The average length is 15 feet, with a measured capacitance of approximately 250 $\mu\mu$f. This is comparable to the capacitance of the wire in the electrode. For example, suppose the inter-connecting lead and the wire in the electrode each measured 250 $\mu\mu$f. At a test potential of 5000 volts, the total relay current would be 0.94 milliamperes instead of 0.47 milliamperes. For this particular wire, 100% increase in current would be required to trip the relay, assuming the sensitivity was set to trip at .98 milliamperes.

* * *

In the above example reference is made to magnitude change in current only, but it is quite possible for a fault to exist resulting in a change of power factor angle without any change in magnitude. In this case, a fault would pass undetected but would undoubtedly break down further on in the manufacturing cycle. A phase angle relay would provide the most complete sensing system, as all faults with or without current magnitude change would be detected. The sensitivity of this system would be affected by lead capacitance as mentioned earlier, and also by the power factor resulting from insulator leakage. However, its sensitivity for detecting faults would be far superior to existing systems.

* * *

In order to establish parameters towards selection of a phase detector, a series of photographs were taken. Figure 1 is a schematic representation of the physical set up. The voltage of the wire plus wire charging current are superimposed on Figures 3, 4, and 5, with Figure 2 providing a true sinusoidal wave form for comparison purposes.

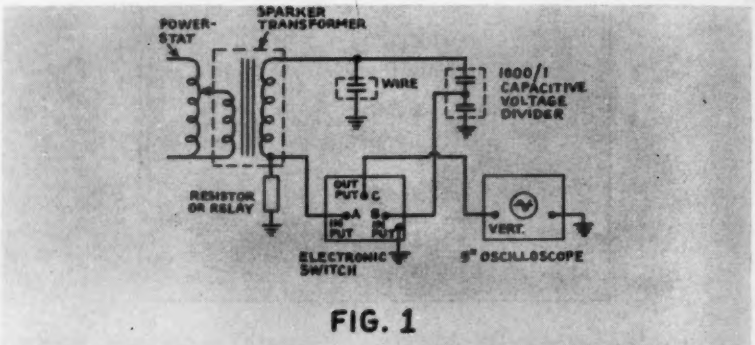

FIG. 1

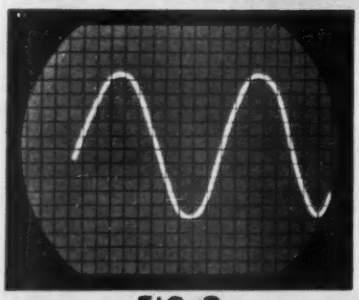

FIG. 2

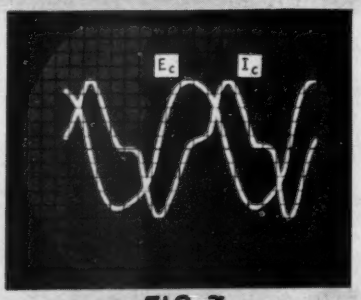

FIG. 3

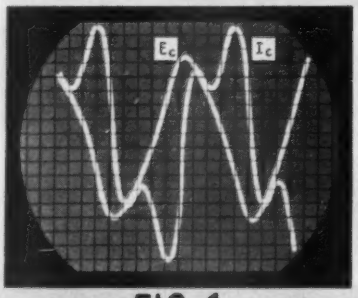

FIG. 4

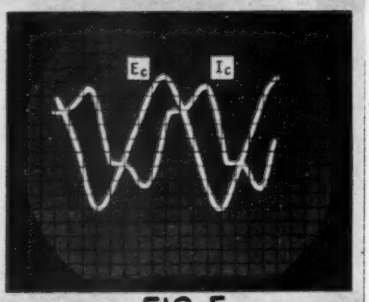

FIG. 5

* * *

Figure 3 is without wire in the electrode.

* * *

Figure 4 #18 AWG with a 35 mil wall of plastic insulation.

* * *

Figure 5 #14 AWG with a 80 mil wall of rubber insulation.

* * *

In each figure current is shown to the right of the voltage wave form with a very high percentage of third harmonic. I believe this to be caused by the high reactance of the sparker transformer. If we compare the voltage wave form of Figure 2 with the voltage wave form of Figures 3, 4, and 5, we find they differ, which indicates an

error will exist in the interpretation of the applied voltage. These wave forms are peaked, resulting in a higher stress level.

★ ★ ★

In comparing Figure 2 with 4, the amplitudes of the wave forms differ. The peak value of voltage is equal to the product of 1.4 and the RMS value. In this case the RMS sparking voltage for Figure 2 was 5000. Peak voltage then is equal to 7000 volts. The total divisions from the center line to the peak is 5, resulting in 1400 volts per division, but in Figure 4 the peak extends to slightly over 6 divisions with a resulting maximum stress of 6 x 1400=8400 volts.

★ ★ ★

What is the point to all this? We originally stated the spark test RMS voltage was 5000 volts, but we find from this analysis we are overstressing the insulation by 17%. This error will increase with higher current loads. If a spark test operation is critical, the standard voltmeter will not indicate the true maximum stress. We should either closely calibrate the voltmeter scale correcting for the above error, or install peak-to-peak voltmeters calibrated in RMS. It should be mentioned at this time that considerable error will result in voltage readings if the voltmeter is connected into the primary circuit—always connect them in the transformer secondary.

★ ★ ★

Continuing on with our analysis, the next point to discuss is—what factors determined the rule of 333 fpm per foot of electrode. This rule states the wire must be under stress for 0.15 seconds. One source stated the rule was based on the trip speed of relays available at that time, which is a logical answer, and if anyone can offer other factors, I would appreciate hearing them.

★ ★ ★

This 0.15 second time period is equal to 9 cycles on 60 cycle A.C. test. It is a well known fact that insulation failures due to internal heating will occur at elevated potentials, but I find it difficult to imagine any appreciable heating will result in a time period of 9 cycles. If this point is true, the simplest solution to all the problems of A.C. sparking can be eliminated by converting or replacing present equipment to D.C. The sensitivity of D.C. is far greater than A.C., and with the low values of current required, it will be far safer to operate. However, if we are to spark with D.C., the spark potentials have to be raised by the $\sqrt{2}$ for equivalent values. For those operations requiring A.C. spark testing, the suggestions listed earlier should prove of value.

★ ★ ★

In Summary—

Install a water electrode or equivalent for increased sensitivity.
Provide a means of fault detection with a phase relay.
Check and calibrate the wave form for accuracy.
Use a D.C. sparker where applicable.

★ ★ ★

This simple analysis of the spark testing program points out the need for more concerted effort on the part of sparker designers, plus a re-evaluation of the specifications governing spark potentials and sparker requirements.

Electrical Spark-Testing

by J. K. Gillett
Entwistle Manufacturing Corporation
Providence, Rhode Island

As a part of the Symposium on Electrical Testing, this paper was presented at the Annual Convention of The Wire Association in Atlantic City, N. J., on October 14, 1958.

The prime function of spark-testing insulated wire is to provide rapid detection of faults, thereby preventing unnecessary processing and handling of faulty wire and cable. Also, detection of faults early in the operation often allows corrective measures to be taken to prevent further defective insulation. The Wire Sparker, to be capable of this, must have a high speed of response and sufficient sensitivity to detect faults under all conditions of test. In addition, the sparker must be non-destructive to the insulation and afford maximum safety to operating personnel. It is essential that these requirements be met in the design of spark-testing equipment, if it is to meet modern production needs.

For this reason we have employed an electronic fault detector for rapid and reliable detection of faults, and a current limiter to prevent the fault current from exceeding a safe level.

★ ★ ★

The electronic fault detector consists essentially of a trigger circuit, which has the characteristic of converting an input pulse of short time duration to an output pulse of predetermined time duration. The input pulse, which is derived from the fault current in the insulation under test, triggers the electronic circuit, thus starting a cumulative action which leads to an output pulse of relatively long duration. This output pulse is preset to have sufficient magnitude and duration to reliably operate the fault indicating circuit. Since the fault signal in the electrode need only last long enough to trigger the detector, reliable fault detection at high speeds is assured.

★ ★ ★

The sensitivity of the Wire Sparker, here defined as the change in fault current necessary to effect fault indication, determines the magnitude of fault which can be detected. With the electronic fault

(*Please turn to page* 249)

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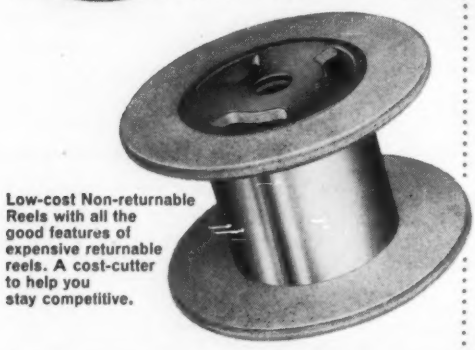

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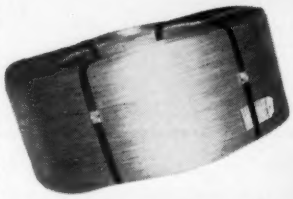
Special equipment for handling big reels and coils of wire. Lifts, tilts, and turns heavy loads easily!



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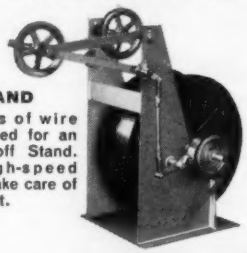

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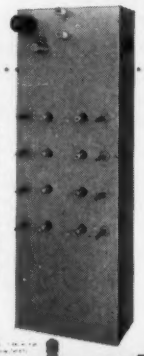

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Maintenance and Testing of Wire Sparking Equipment

by John W. Huether
Supervisor, Instrument Service Section
Canada Wire & Cable Company Ltd.
Leaside, Ontario, Canada

A paper presented at the Annual Convention of The Wire Association in Atlantic City, N. J., as a part of the Symposium on Electrical Testing, on October 14, 1958.

As the individual time allotted those of us speaking to-day at this electrical testing session is somewhat brief, I am confining my remarks to one small aspect of this broad subject, namely the Maintenance and Testing of Wire Sparking Equipment of the Alternating Current Class.

* * *

I propose to divide my remarks up into four sections; which are as follows:

ONE: **The various common types of Fault Detection Circuits associated with A C Wire Sparkers.**

TWO: **Methods of Checking Fault Detection Circuits.**

THREE: **The construction and use of a small portable Fault Sensitivity Checker for A C Wire Sparkers.**

FOUR: **General considerations as to Routine Wire Sparker Maintenance.**

Section One

Common Types of Fault Detection Circuits in Wire Sparkers

Let us quickly review the basic types of fault detectors. There are three.

First Type of Fault Detector

The Alternating Current Sensitive Relay. This was probably the pioneer of fault detectors. As shown in Fig. 1, a wire sparker, stripped of all its gadgets, consists basically of a variable voltage supply transformer feeding a high voltage transformer whose output usually is either 15 KV or 30 KV. To obtain 30 KV, two 15's are often cascaded. The current output of these transformers is of the order of 100 ma. The kilo-voltage is monitored by a suitable KV meter. The high tension lead of the KV Transformer goes to the insulated electrode trough through which the coating of the wire under test is passing; the ground return from the conductor of the wire under test passing back to the lower end of the high voltage winding through the coil of the A C Current Sensitive Relay.

* * *

This type of fault actuator is still used, although it has certain inherent disadvantages; one being that a minimum level of signal must be established as a base; faults being then classified as any signal which exceeds this base current.

* * *

This makes the testing of leaky cables not having definite breaks in their insulating sheaths a problem.

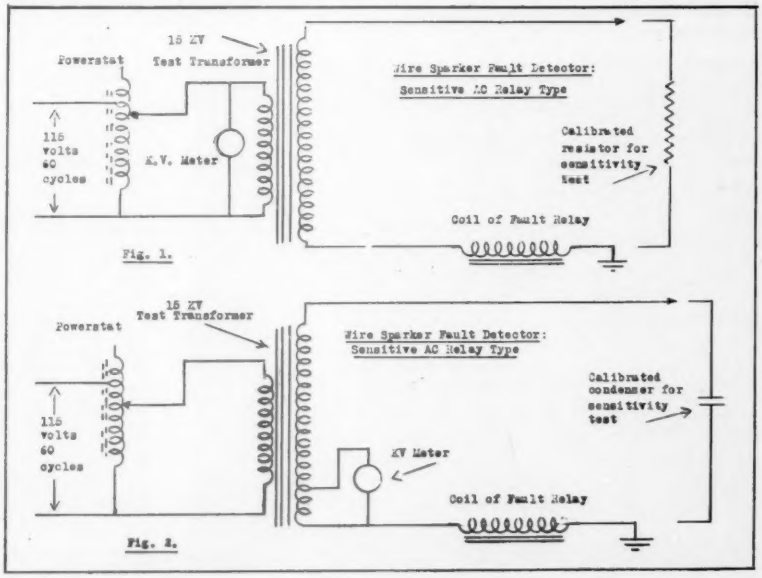
Second Type of Fault Detector

A later and very rugged fault detector attempted to over-come the spurious signal due to leakage by adding two components:

(a) A small capacity condenser (Fig. 3) in parallel with the high voltage secondary winding of the K V Transformer, and

(b) A spark-gap in series with the ground return (low) side of the same high voltage secondary winding.

What now was accomplished was the setting up of a parallel resonant circuit by the inclusion of the condenser. When a fault occurred, R F was generated in the parallel resonant circuit and this same R F easily jumped the spark-gap, taking with it the 110 volt 60 cycles supply to the fault relay coil. Due to the width of the gap (0.010") the 110 volts normally was prohibited from completing



its circuit.

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This spark-gap detector did away with the need of sensitive A C Current Relays (which were always getting out of adjustment) and substituted a rugged industrial type of relay whose inherent stability was much greater.

Third Type of Fault Detector

Within the past few years still another type of detector has appeared: the Pulse Type.

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This has been necessitated by the higher line speeds of extruders and the lower sparking voltages demanded for very thin walled applications. As wire speeds increase, the fault becomes both more fleeting and of smaller "punch".

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The pulse type fault detector (Fig. 6) substitutes as its primary detection device a pulse transformer. This transformer amplifies the fleeting fault and passes it on to a one or two tube amplifier whose output actuates a current relay in the amplifier's plate circuit. These units are said to be extremely sensitive to both short and small fault pulses. Anyone wishing to play around with this circuit can start by obtaining any of the common vertical output transformers presently used in T.V. receivers. These have a step up signal ratio of approx. 40 to one and are ideally suited as "pulse" transformers.

Section Two

Methods of Checking Fault Detector Circuits in Wire Sparkers.

The fault detectors of the AC current relay type is usually checked with a calibrated resistor of such value to give a definite current flow at the established test voltage.

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The Spark-Gap detector or pulse transformer detector is commonly checked with a calibrated condenser. (Fig. 2).

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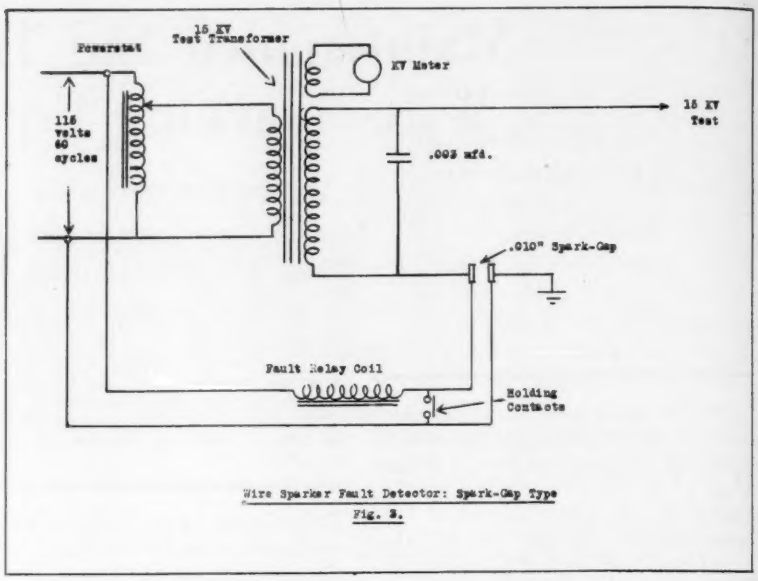
A more sophisticated checker employs a selection of capacities



Wire Sparker Fault Detector: Spark-Gap Type
Fig. 2.

Conventional Fault Detection and Recording System for Wire Sparkers

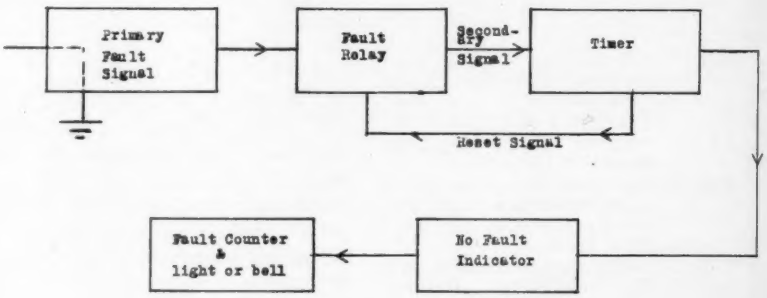


Fig. 4

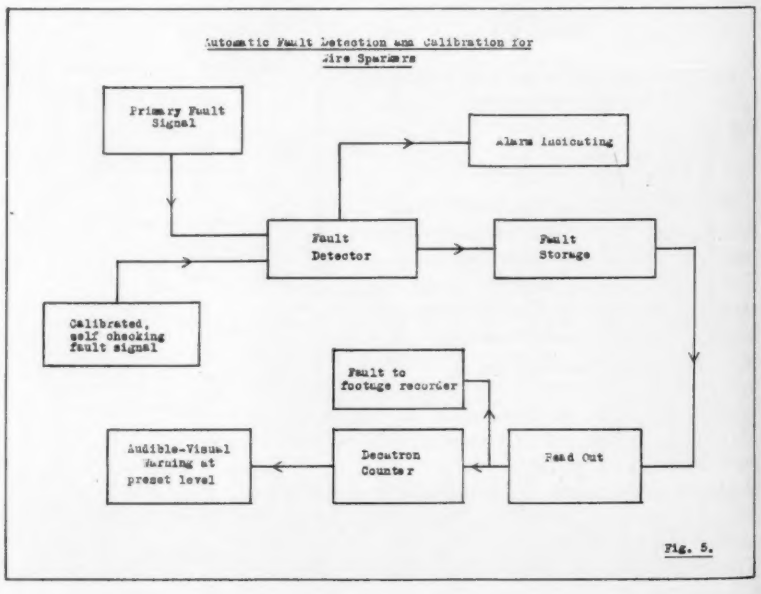


Fig. 5.

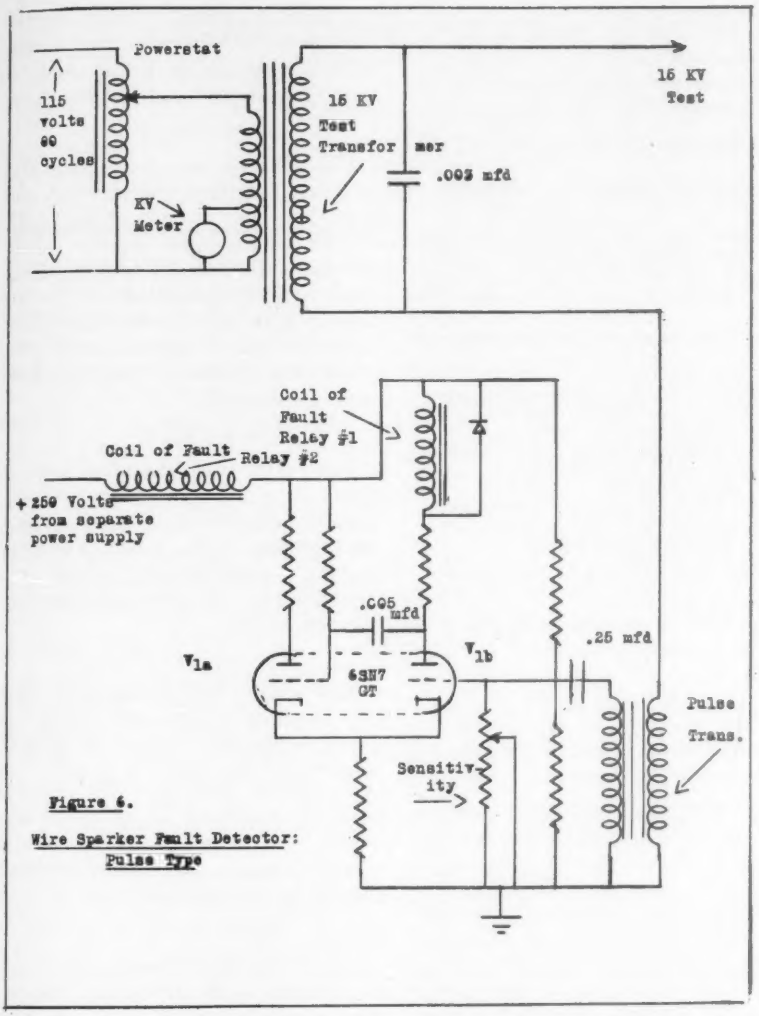


Figure 6.

Wire Sparker Fault Detector: Pulse Type

that can be substituted into the test circuit. The selected value of capacity is placed in series with a calibrated timing device and the whole unit placed across the wire sparker under test. The timing device allows the test capacity (in micro-micro farads) to be established across the sparker for a given number of line frequency cycles. This is an attempt to duplicate the speed at which the fault is passing through the electrode of the sparker.

Figure 8

Portable Probe for Checking Sensitivity of A C Wire Sparkers

Parts List

Unit Part No. As Shown in Fig. 7.	Quantity	Description	Unit Cost
5 & 7	2	TV-20 CRL Condenser 500 mmfd. 20KV working voltage (D C)	1.20
	2	TX-2 Fittings for above	.08
6	1	Piece Celeron Rod 1-1/4" O.D. x 1" Thick	.20
3 & 4	2	Amphenol 4 prong polystyrene coil form #24-4P	.32
8	1	10" piece Brass Welding Rod .25" dia.	.30
9	1	10" Piece Bakelite Tube .25" I.D. x 1/16" wall	.55
1	1	Alligator Ground Clip, Mueller #60-S	.11
2	5 ft.	Insulated Ground Lead	.09
10	½ ft.	#14 Solid Copper Wire	NC
		Total Cost of materials	4.45
	2	Hours labour to construct.	

Section Three
(See Figs. 7, 8, 9 & 10)

The Construction and Use of a Small Portable Checker for Fault Detector Units in Wire Sparkers.

This device, developed and assembled by **Mr. T. Wilton** of the Instrument Service Section, consists essentially of two 500 mmfd. TV type condensers rated at 20,000 D C working volts. These condensers are placed in a suitable polystyrene handle, complete with insulated probe, built in spark gap (over-voltage protection for the

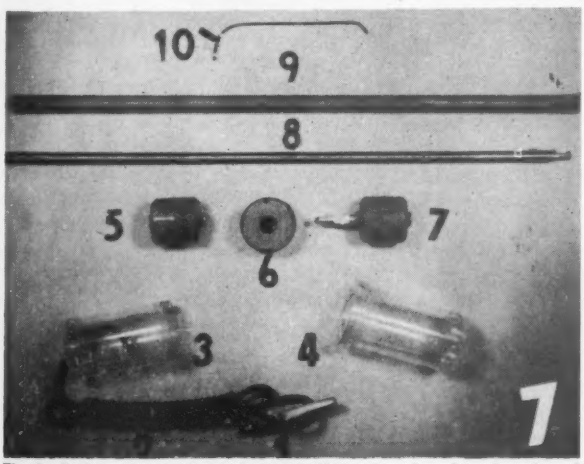
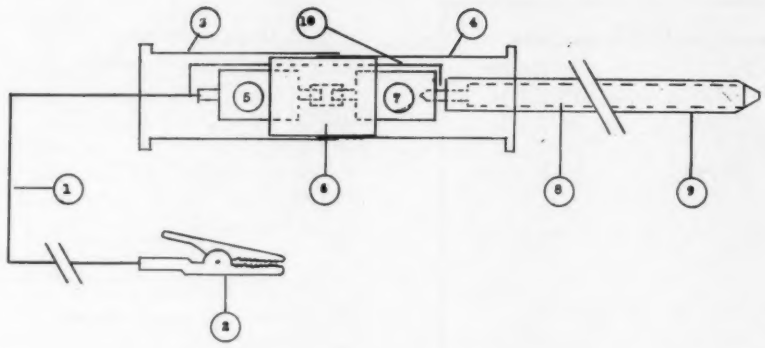


Fig. 7—Probe parts laid out for assembly.

Fig. 9—Complete probe assembly for checking sensitivity of AC Wire Sparkers.



Internal Arrangement of Probe Components

Fig. 10.

Symbol	Description
1	Alligator Clip
2	Grounding Lead
3 & 4	Amphenol Coil Forms #24-4P
6	Celeron Shield
5 & 7	TV-80 CRL Condensers 500 mmfd.
8	Brass Center Rod
9	Bakelite Insulating Tube
10	Spark-Gap Wire

user) and necessary length of ground lead terminating in an alligator clip.

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Fig. 7 shows the parts laid out ready to assemble.

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Fig. 8 is a parts list of the components with their description and unit cost as of Oct. 1958. The total cost of materials for one probe was $4.45 and the labor to assemble took two hours. We estimate the probe can be made for $10.00 complete.

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Fig. 9 is a photograph of a complete probe assembly.

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Fig. 10 is a sketch showing the internal arrangement of the probe components. Note the celeron spacer between the two condensers —this serves a dual purpose:

(a) as an insulator for the center connections of the condensers and

(b) by carefully machining its outside diameter it acts as a plug to keep the upper and lower polystyrene forms in place by means of the snug fit.

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Note also in the sketch (Fig. 10) the spark gap of solid bare #14 copper wire running through a hole in the celeron shield to the grounding terminal of the lower condenser. This gap is set for 7.0 KV when the probe is first assembled. The probe is used at voltages of 6 KV and lower.

Section Four

General Considerations in Routine Wire Sparker Maintenance.

The portable sensitivity checker previously discussed is easy and quick to use. All Canada Wire Sparkers are tested for sensitivity every seven working days. Previously, the setting up of a motorized type of sensitivity check took so long per sparker (a matter of twenty minutes) that weekly checks were not possible. The development of the portable probe type checker reduced the check time to three minutes and dispensed with the necessity of an extra technician to watch the rotary equipment.

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In use, the wire sparker under investigation is set for 6 KV volts output, the ground lead of the probe attached to the ground post on the electrode stand, the probe inserted through any convenient hole in the electrode guard and the point of the probe swept across the hot center carrying the wire trough. Twenty-five out of twenty-five pulses must be indicated by the fault signalling device on the wire sparker itself. If not, adjustments to sensitivity unit must be made. During the weekly check, all wire sparker safety interlocks are also checked. Range lights, KV Meter, fault counters, horns, bells and warning lights are inspected and replaced if necessary.

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KV Meters are inspected and calibrated at least once a year, and always if any major repair work is done on the Wire Sparker. Secondary standard Kilovolt meters used by the Instrument Service Section are calibrated against primary voltage standards periodically by the Research and development laboratory.

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The care and maintenance of plant Wire Sparkers is not a haphazard assignment of an electrical maintenance department, but is a routine carefully supervised responsibility of the Instrument Service Staff.

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The writer has deliberately left the sparker diagrams simple to merely illustrate the points of this brief talk. (See Figs. 4 & 5).

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Fig. 4 is included to show in block diagram the complete functioning of a wire sparker.

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Fig. 5 is a block diagram of what the writer would ultimately like to see in wire sparker circuitry. Of course—parts of this diagram are now included in many standard sparkers on the market today, but there are a few features that should be enlarged upon. I will run over them briefly.

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A "Calibrated Self Checking Fault Signal" is incorporated in some units offered today. However, making this function completely automatic would entail a rapid series of fault pulses to be generated during change-over of reels, these pulses to be totaled on a separate checking circuit.

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"Fault Storage" and "Read-Out" are becoming more of a necessity as wire speed increase and the trend is to shorter, not longer electrodes.

(*Please turn to page* 248)

Value and Application of Sparkers

by Gordon Bamber
Phillips Electrical Company Ltd.
Brockville, Ontario, Canada

This paper, a part of the Symposium on Electrical Testing, was presented at the Annual Convention of The Wire Association in Atlantic City on October 14, 1958.

It should be made clear from the start that my views are based on experiences as a Laboratory man with commitments in certain production areas. I think it is true to say that we all realize that close knitting of Laboratory and Production Groups is the only method of attacking present day problems in the wire industry, and in this respect the Sparker is a very solid link between the two sections. It is also very often the last operation to ensure quality for the customer.

* * *

To operate an instrument which has to satisfy both Laboratory requirements and factory conditions is difficult, but nevertheless an essential requirement if the process is to be of meaning. At the same time the unit must assist the Production Group in preventing further processing of faulty, or potentially faulty, insulated wire. These are the aspects of testing and rewinding I offer for discussion today.

* * *

First, I suggest that a bead electrode no longer meets all the requirements of today. This can be modified for internal use, but most examining authorities do specify the use of beads, presumably because these bodies are awaiting satisfactory proof of an improved system. It will be interesting to see if such is offered at the discussion today. I hope we all agree that the present system can produce inaccurate results, and also destroy the faulty area.

* * *

The sensitivity of the unit is another difficult problem. Since most examining authorities do not specify a Sparker Unit Test, but take the water test as a reference, it would seem that cable manufacturers must establish their own ideas on what constitutes a pin hole or weak spot. Is it not possible to produce a sensitivity tester which is satisfactory to all concerned? There has been one brave effort, possibly this may be discussed later.

* * *

As regards the application of the Sparker and again speaking as a Laboratory observer, I feel sure that the Production Engineers require positive indication of the extrusion quality, and that this information should be available to the rewind Operator to reduce his rework time. Not only, the number, but also the position of faulty spots should be given, and the rewind Operator can act accordingly. Now it just does not work when you ask the extruder Operator to note these facts down —they have more troubles than anyone else in the Plant! A punched paper strip, showing relative hole position, or a relay operated printing wheel, showing actual footage points are being used in the U.K., I personally have not seen them in use here.

* * *

Another question the Production Engineer must ask of the Sparker is simply "Is it economic to send this wire for further processing?" A near pin hole is a sure pin hole after twisting and cabling, and by the present method will only be positively shown at final test. We all know that this is a costly stage for a pin hole failure.

* * *

I suggest that we should offer some bending of the wire, actually in the electrode. Is it good practice to test the wire under straight conditions, and bend it afterwards, thereby completing the fracture or opening the hole? In this respect there is a trend toward "kid glove" rewinders which offer superb control, patching facilities, a constant one pound tension and a test with the wire straight. Do the last two factors satisfy the Production Engineer when he considers the rigours of further process work? We do not, of course, go to the bad old days, but we should have a realistic test, since the problem is the same for both the next Operator and the customer.

* * *

A request to the instrument designers, if I may,—please do not offer new equipment with sensitivity controls and other variables exposed to the Operator. Two position sensivity switches allow easier design, but they do not help the Foreman on wide range testing. Miniature voltmeters are not the best of attachments, particularly with multi-ranges and inaccessible locations.

* * *

Maintenance, of course, is of the utmost importance if the results are to mean anything. In this respect we are working on a simple Operator test showing him sensitivity and voltage calibration checks.

* * *

The future trend is, I feel, towards non contacting electrode types. The result should be increased speed, more consistent results, and non destructive testing. I have met only one of this type, apparently designed for general work and uses high frequency impulses. Another recent change is the use of D. C. on the conventional electrodes, providing many advantages. It will be interesting to hear your comments on this trend.

* * *

Finally, from a simple, often

(*Please turn to page* 249)

Spark Testing—Continuous Inspection Tool

by Harry B. Slade
Research Engineer
The Okonite Company
Passaic, New Jersey

A paper presented at the Annual Convention of The Wire Association in Atlantic City, N. J., on October 14, 1958. It was a part of the Symposium on Electrical Testing.

In the manufacture of wire and cable the ordinary statistical quality control is not always considered to be good enough to assure the customer, or the manufacturer for that matter, that the insulation is continuously good from end to end as represented by the samples taken at the ends. In order to make up for the shortcomings of end inspection, many tools have been developed for continuous inspection of insulation and wire. Among these perhaps the one with the greatest popularity and use is the spark testing technique, where an electrode of some form such as water, bead chains, rollers or other electrical contacting means is elevated to a high voltage and the conductor of the insulated wire is grounded at the ends while the spark test is applied.

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At our Company, where spark testing has been going on for over forty years, it is used as an inspection tool and is not ordinarily substituted for final water testing except on certain grades of plastic wire where it appears to be a suitable practice to follow the Underwriter's provisions for spark testing 100% of the wire and tank testing only a small portion as a check on the integrity of the spark testing machines. It is considered by us that high voltages applied for 2/10 of a second or slightly longer do not completely duplicate the results of a five minute application of a-c voltage followed by ten or fifteen minutes of d-c voltage of a value approximately three to four times that of the a-c tank voltage. However, we do look toward the spark test as a means of minimizing or possibly eliminating the incidence of tank test failures.

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In our inspection work with spark testers, we have extended the use of this tool to the inspection of calendered strips of insulation, testing integrity of the center portion of the strip on specimens as narrow as one inch up to the full width of a calender, or about thirty-six inches. This method allows the location of pinholes or voids in material before it is applied to the wire as insulation and these weak spots can be readily eliminated in the unvulcanized compound. At later stages of manufacture we inspect the unvulcanized insulation as it is applied to wire to make sure that no pinholes or voids exist. In the same manner, on insulating machines of the extrusion type we check completed plastic insulated wire or vulcanized rubber but are unable to check prior to vulcanization.

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A number of years ago, in an effort to make the spark testing equipment pick out imperfections more reliably we added a second electrode of bead chains ahead of the normal a-c section and—using the a-c voltage of the sparker unit—fed this voltage into a circuit producing a d-c voltage approximately double the a-c. The d-c voltage connected to the electrode ahead of the a-c electrode has resulted in a reduction of about 25% in the incidence of tank test failures. It was considered unnecessary to develop a trip-out mechanism for the d-c unit as we simply allow the d-c to puncture where it will, and the second electrode carrying the a-c takes care of the trip-out mechanism. It is now standard practice for us to use this double electrode system wherever we first inspect vulcanized wire and the results have been rather gratifying.

★ ★ ★

Another innovation in spark testing has been the development of a small strip chart on which we record not only the number of spark failures, but their approximate location. Our customary lengths of high grade cable are about 4,000 feet long and by using proportional drives on the strip chart we produce about one inch of tape for one hundred feet of cable. The indications of spark failures are then recorded on this tape and a simple ruler indicates the approximate position of the leak. By this means we can determine whether a section of cable is faulty or whether the spark failures are scattered enough to be normal.

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In general we would point out that the principle of continuous inspection such as is possible with the spark test units has been carried further in a number of ways and opportunities probably exist for still further use of this type of tool. One of our own developments is a device for continuous inspection along the lines of measuring the ionization which occurs within the cable at high voltage. This could be considered a spark tester with a college education, or, better still, intelligence, using electrodes which do not generate ionization and detecting the internal discharges in the cable by very sensitive high frequency detectors. This method has enabled us to inspect cable with a non-destructive tool and measure the severity (voltage extinction level) or complexity of the ionizable voids in the cable so

(*Please turn to page* 247)

Some Notes on Spark Testing

by James L. Entwistle, President
Enjaco Corporation
(Formerly James L. Entwistle Co.)
Cranston, Rhode Island

This paper, a part of the Symposium on Electrical Testing, was presented at the Annual Convention of The Wire Association in Atlantic City, N. J., on October 14, 1958.

It is almost exactly 40 years ago that we introduced into the **Phillips Wire Company** in Pawtucket, R. I., the first Spark Tester which gave promise of eventually being capable of replacing the old sloppy, cumbersome, space-consuming and expensive Water Tank Test.

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The particular fault locator which this first Spark Tester replaced, was a vibrator-type spark coil, the locating voltage of which oscillated continuously between 6,000 and 21,000 volts.

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Some of the other fault locating means in use at that time were just about as crude, if not cruder than this vibrator spark coil. One of them that comes to mind was a method under which the operator held a wire from a battery on his tongue and passed the wire being tested thru a wet sponge held in his hand, connected to the other side of the battery. When he got a tickle on the end of his tongue, he knew that a fault had gone thru the sponge. This old method is especially interesting in the light of the old Yankee saying that, "If you wait long enough, history will repeat itself". You are all probably aware of the fact that little pieces of wet sponge are again being proposed as testing electrodes.

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Spark Testers made slow progress as replacements for the long-established Water Tank test until in the middle thirties, when an English cable factory, Glovers of Manchester, which had imported some of our Re-Reeling and Spark Testing equipment, sponsored a series of tests of Spark Testing versus Tank Testing extending over a period of about two years. As a result of these tests the British Government published a set of Standards under which Spark Testing was accepted as a replacement for the old Water Tank test on certain types of wire.

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I believe that the wire industry owes a very considerable debt of gratitude to Mr. Crellin of Glovers who recognized the value of this new testing tool, and who, in spite of considerable opposition and even some ridicule, carried out the long series of tests which resulted in the change in the British Standards Specifications, and which, subsequently has saved the Industry untold thousands, yes, even millions of dollars.

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As with all other good tools, the value of Spark Testing to the Industry depends upon how the tool is used. If we are to retain and further the great benefits of Spark Testing, we must be careful not to jeopardize the reputation which it has acquired as a quality tool, by the improper use of inadequate equipment.

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It might be well to define, at this point, some of the important factors to be considered in the use and design of Spark Testers.

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First of all, since Spark Testing has become the watch-dog of the quality of an insulated wire plant's product, then it is obvious and cannot be emphasized too strongly that practically every extruding or insulating operation, whether it be with rubber, or plastic, should be done under the watchful eye of an efficient Spark Testing equipment. While, of course, it is not possible to stop the insulator to repair wire in this initial insulating operation, the Spark Tester will nevertheless give instant warning of the production of faulty wire. Its immediate warning, in case voids begin to appear in the insulation, will prevent the production of large quantities of wire which might subsequently have to be scrapped. This seems to be a very obvious point, so obvious, in fact, that it seems almost unnecessary to emphasize it. However, we are sure that if a bird's-eye survey could be made of the insulating machines in use tomorrow morning, dozens upon dozens of them would be found to be operating either without Spark Testers, or operating with very efficient Spark Testers which are turned off.

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Spark Testers used in this initial insulating operation can be equipped with recording instruments, which will furnish the manufacturer with permanent records of the results obtained by operators, machines, processes or compounds for the purpose of quality control. They also serve as a constant reminder to the operator that a record of the quality of his work is being kept.

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Spark Testing at this initial insulating operation is generally not under the jurisdiction of Standards and Specifications issued by governing authorities, such as Underwriters' Laboratories, Governmental Agencies, etc. Such authorities properly limit their requirements for Spark Testing to the final manufacturing operation so that any damage to the insulation, either there initially, or subsequently produced by handling or processing after insulation, will be located as the product is finally packaged for shipment to the customer. These initial and final operations are the two most important points in the

manufacture of wire where Spark Testing should be done, the first, for the protection and benefit of the manufacturer himself, and the second, for the protection of the customer. It is obvious that at these two points, the finest possible Spark Test equipment should always be used.

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So much for the use of Spark Testing.

★ ★ ★

Next, let us examine some of the features which should be incorporated into the design of any Spark Tester that is to be used as a replacement for Water Tank Testing.

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The first point that always arises in a discussion of Spark Testing is the question of how much voltage should be applied to the insulation. The answer to this point depends entirely on the decision of how good a product a manufacturer wishes to produce. If we go back to the fundamental purpose of putting insulation on a wire, we come up with the simple answer that we do it to keep the current in the conductor flowing in the path in which we want it to flow to the equipment we want it to operate. The voltage of the circuit is always trying to find a short-cut to the point of its origin.

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We cover the conductor with insulation to prevent the voltage from finding leakage paths to ground, or to the other leg of the circuit, which would, of course, allow current to be drained off along the way. If we put, for example, 4/64" of plastic on the conductor to adequately prevent the breakdown of the insulation by the voltage of the circuit, then we have to decide just what percentage of that wall we actually want our product to be sure to have at every point along the wire. In other words, we have to decide whether we will be satisfied to have at least 2/64" everywhere on a wire that is supposed to have a 4/64" wall of insulation, or will as little as 1/64" be sufficient. Or, we may go to the extreme and decide that we will be satisfied to produce a wire which we are sure has no voids straight thru to the conductor. Once this question of what he wants has been settled in the mind of the producer, then it is a simple matter to select the voltage which should be used for Spark Testing such a wire. If all he wants to find are actual voids right thru to the conductor, then we have to apply a voltage sufficient only to jump an air gap represented by the thickness of the insulation wall. If, on the other hand he decides that he wants everywhere, at least 25 per cent of the nominal wall thickness of insulation on the wire, we must determine the voltage breakdown required by this amount of insulation, plus the voltage required by an air-gap equal to the remaining 75 per cent of the wall thickness, and apply such a voltage to the insulation.

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The practical difficulty that is usually encountered with this more-or-less obvious solution to the voltage problem, is that a manufacturer often decides the question of what he wants to find by saying that he definitely wants to locate all faults, which extend three-fourths or more of the distance thru the insulation.

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This seems a logical answer to the question, for the thought immediately pops into one's mind that if 1/64" of insulation is sufficient, why put on 4/64". When, however, a voltage sufficient to do this is applied by the Spark Tester to the wire, then the manufacturer usually accuses the Spark Tester of damaging his wire because of the unexpectedly large number of faults which the Spark Tester locates. This feeling that the application of high voltage during Spark Testing actually damages the insulation is a fairly prevalent one today. In the "Heyday" of rubber insulation, this feeling was a very widely-held view. We would like to emphasize, that in our 40 years of experience in the Spark Testing field, we have never uncovered a single case of damage caused to insulation by a properly used Spark Testing equipment. It is our opinion that this feeling probably got started as a result of Spark Testing the same reel of wire over and over again, and finding additional faults as this was done. It is perfectly true that if a reel of wire is Spark Tested, the faults noted, and then the wire is Spark Tested again and again, a small number of additional faults may show up as the testing goes on. It is likewise true that if a reel of wire is Tank Tested, the faults noted and repaired, and then the wire is Tank Tested again and again, additional faults will show up. The reason for this is probably two-fold. First of all, there is always the possibility of opening voids, which were perhaps sealed off by a very thin coating of insulation, as the wire is flexed in winding and unwinding in repeated testing. There is also the fact that there is always a time element present in the voltage breakdown of insulation. It is principally because of this time element that the original British Standards specified that the wire must be in the Electrode Unit for a finite period of time, which, translated into electrode length, means that one foot of Electrode Unit should be provided for each 600-ft./min. of maximum wire speed.

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In our recommendations to manufacturers, we adopted a factor of safety and recommended that the electrode length be calculated on the basis of one foot of Electrode Unit for each 400-ft./min. of maximum wire speed.

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The above figures are, of course, for a 60-cycle applied voltage. Considerable interest has been shown recently in the possibility of using direct-current Spark Testers instead of 60-cycle Spark Testers in order to reduce the required electrode length in view of the fantastic lengths which electrodes have to have in order to be used with some of the new wire speeds of 3000 to 5000-ft./min.

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The problem of using D.C. instead of A.C. offers a very simple solution, for it boils down to simply determining how much A.C. peak voltage is applied for how long under present 60-cycle Standards and then applying the same D.C. vol-

tage for an equivalent period. In our recommendations for D.C. Spark Testing, we have indicated that if and when D.C. Spark Testing is allowed, the D.C. test voltage used should be equivalent to the peak of the specified 60-cycle test voltage. Such a D.C. voltage should then be applied to the wire for 20 per cent of the time of application of the 60-cycle test voltage. Translated into electrode length, this means that if we have a testing specification which indicates a test voltage of 10,000 volts, 60-cycle A.C., and a wire speed condition which indicates the use of a 5-foot Electrode Unit, then a D.C. test voltage of approximately 15,000 volts should be used with an Electrode Unit of only one foot in length.

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The value of 20 per cent was arrived at in the following manner: If we plot out a standard sine wave representing an A.C. voltage, and mark off on the horizontal axis of such a wave the time that the curve is above 95 per cent of its peak, we find that such time is 20 per cent of the total time axis of the wave. This means that if we apply a D.C. Spark Test voltage having a value approximately equal to the peak of an A.C. voltage to a wire, we have a more severe test if the D.C. voltage is applied for only 20 per cent of the time that we would apply an A.C. voltage. What we are doing, of course, is actually eliminating all of the time that the A.C. voltage is below 95 per cent of its peak. We feel that our theory with regard to this matter is sound, and are at the present time setting up comparative tests to either prove or disprove the theory.

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Some questions have been raised as to the relative values of A.C. and D.C. Spark Test voltages with the thought in mind that on long-time breakdown tests it has been found that D.C. voltages required to give equivalent tests to A.C. voltages should be considerably higher than the peak values of the A.C. test voltages. We have no quarrel with this fact, but still believe that in Spark Testing, because of the fact that the voltage is applied for an extremely short period of time, the ratio of applied voltages, D.C. to A.C. should be approximately in the ratio of peak to r.m.s. value. In other words, we feel that the shorter the time of application, for equivalent test results, the closer together will the two voltages become, of course, always considering that the D.C. voltage should be equivalent to the peak value of the A.C. voltage.

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While we are on the subject of the time of application of the test voltage, we would like to point out a fact which does not seem to be very well understood throughout the industry. If we are going to discard the feeling which has been held, up to this time, that test voltage should be applied to the wire in Spark Testing for a finite period of time, and accept the new idea which is being proposed occasionally that we need apply a test voltage for only an almost infinitesimal time, then there need not be any great discrepancy in the lengths of Electrodes for A.C. and D.C. Spark Testing. It is only necessary in the case of an A.C. Spark Test to have an electrode of a length to insure that the A.C. voltage is applied for at least one-half a cycle, and this, of course, is only 1/120 of a second. At a wire speed of 1500-ft./min. this means that we need an Electrode Unit only 2/10 of a foot in length. In other words, what we are trying to clarify is that the claims now being made that Electrode lengths for A.C. Spark Testing have to be far greater than those required for D.C. Spark Testing, are not true. If we are going to discard the time factor, then it is only necessary to make sure that the electrode is long enough to insure the application of the peak of the A.C. voltage to provide a test equivalent to a similar D.C. voltage applied for an almost infinitesimally short period.

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The crux of the whole situation under these conditions of testing is, of course, the fault location means, and since the same electronic means is used by us in both our A.C. and our D.C. Spark Testers, there is no difference whatsoever in the time of response for the fault indication means.

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While we are on this subject of short Electrode Units, we would like to point out that even though we are talking about Electrode Units of only an inch or two in length, we would like to go on record as recommending that no Electrode Unit less than one foot long be used under **factory** (as opposed to laboratory) conditions of Spark Testing. The reason for this is that we feel that an electrode for use day-in and day-out in the factory under factory conditions must be one which requires no attention whatsoever for a long period of time to maintain its initial efficiency for contact with the conductor. In our opinion, no electrode has ever been devised that is more suitable for this purpose than the bead-chain Electrode Unit. This unit requires no adjustment by the operator and will wear month after month without any attention or maintenance whatsoever. While it is true that there are very small gaps in the actual physical contact of the chain elements with the surface of the insulation, we can, by using an Electrode Unit at least a foot long, have a pretty definite assurance that somewhere thru that length, the bead chain elements will be in contact with practically every bit of the wire surface. Our newest idea for bettering even this condition when testing wire at very low voltages, say in the order of 1500 to 2000 volts, or when testing twisted-pair, is to enclose the Electrode Unit completely, and to fill the enclosure with an atmosphere super-saturated with water vapor, so that the wire surface is covered with a thin film of moisture to provide a complete conducting surface, and to eliminate all possibility of any surface areas not being exposed to the test voltage. Such moistening is so slight that the wire is dry by the time it has made a few turns around the Take-up reel.

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The next item of importance in Spark Testing is the Fault Location circuit. The two most important factors in a fault location cir-

cuit are the speed of response of the circuit to a fault signal, and its sensitivity and stability.

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As far as the speed of response is concerned, we have always adhered to the criteria that the response of the fault detection circuit should be such that it will operate whenever it receives a fault signal, regardless of the shortness of such a signal. In other words, if the insulation of the wire breaks down as it passes thru the Electrode Unit even though the breakdown occurs in the last fraction of an inch of the Electrode Unit, then the fault circuit must operate. Such response can be obtained only by electronic means, as any relay system requires a finite time for the relays to close, and is, therefore, unacceptable. The fault indication must be of the maintained or trigger type, that is the circuit when once tripped must remain tripped until reset by manual or electrical means.

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The question of sensitivity of the fault location circuit is also a very important consideration. The British tests referred to above, which resulted in the adoption of Spark Testing Standards pretty much throughout the World, established the fact conclusively, that the fault location circuit of the Spark Tester must be sufficiently sensitive to operate on less than a complete breakdown of the insulation. In other words, the fault circuit should be sensitive enough to detect voids in the insulation which extend almost, but not quite all the way thru the insulation, and the Standards were therefore, set up specifying a series capacitance which must be inserted in the test circuit of a calibrating unit, used to check the sensitivity of the Spark Tester's fault location circuit. In our opinion, this is of the utmost importance if Spark Testing is going to continue to replace Water Tank Testing in more and more categories.

★ ★ ★

Another point which, in our opinion, is most important is that the fault location circuit should be of such a nature that it is self-adjusting to the testing condition, and that it need no adjustment by an operator to keep it in proper sensitivity under various operating conditions. When high voltage, either A.C. or D.C. is applied to a wire under factory conditions, we have a great many variable factors with which to contend. First of all, we have the question of the condition of the surface of the conductor, whether it is wet, or dry. Secondly, we have the type of insulation to contend with, whether it is a high-leakage type, or a low-leakage type. In addition, we have a wide variety of sizes of wire to accommodate, and in many cases, we have different numbers of wires to accommodate in Spark Testing, such as is the case when we are testing multi-conductor cables. In addition to this, various Spark Testers in a plant will be used under different operating conditions, the primary difference here being the question of how close the nearest ground on either side of the Electrode Unit is to the Electrode Unit. This, of course, governs the amount of leakage current which will travel along the surface of the wire from the electrode to the nearest ground. Let us repeat for emphasis that one of the most important features of a Spark Tester is that it should be equipped with a fault location circuit which will be self-adjusting to the wide variety of testing conditions as outlined above. No Spark Tester should be used which requires manual adjustment of its fault location circuit to maintain it to the proper testing sensitivity under the various operating conditions. Its fault location circuit should not be affected by steady state, leakage or capacitance currents (unless they reach very excessive values) but, should only operate on a change in the steady state current such as occurs when a fault enters the Electrode Unit.

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The last point which we want to stress in this very brief discussion of Spark Testing is the question of the proper amount of current available in the test circuit. Our feeling, very briefly stated, is that the test circuit, at any test voltage should automatically provide as high a test current as is consistent with safety. The reason for this is that when we apply a high test voltage to the Electrode Unit, we have certain leakage currents to contend with, and these currents will tend to reduce the test voltage unless we have sufficient power behind the Spark Tester to maintain the voltage in spite of the leakage current.

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On hot, humid days, or when testing wire, the surface of which is wet, very appreciable leakage current will be present, and will have to be taken into account. In testing with A.C., in addition to the leakage current, we have, a charging current, which likewise has to be taken into account.

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In line with this, the test voltage indicator should always be the type that will truly indicate the **actual** voltage applied to the wire.

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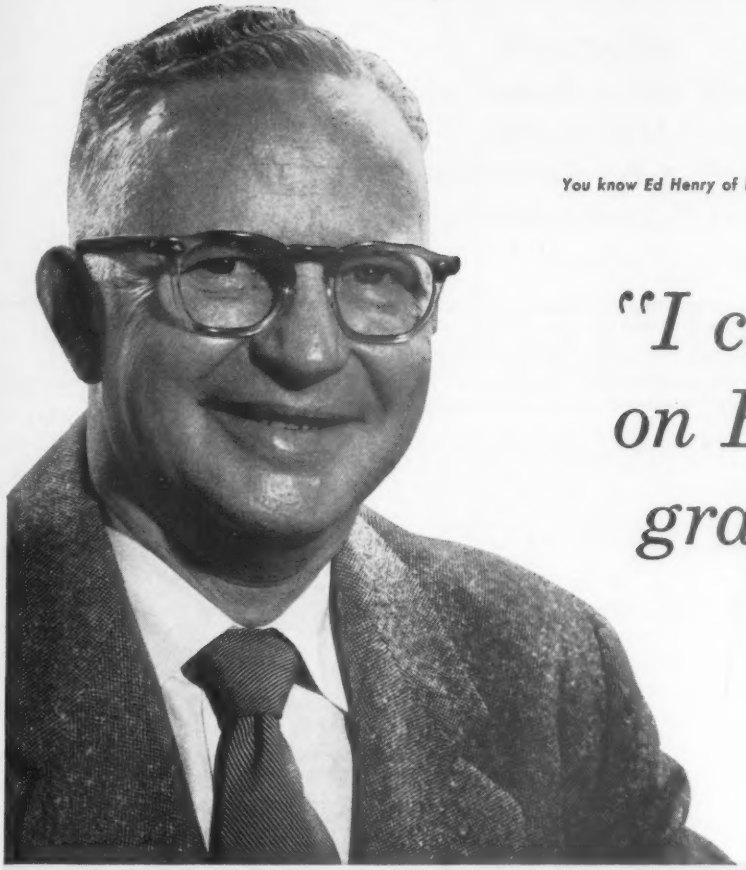
In our early Spark Test Equipment, the secondary current available reached as high as 150 milliamperes and these Spark Testers were used for many years with no fatal accidents. In the late 1930's the General Electric Company asked us if we could produce Spark Testers which would not exceed a 40 milliampere short-circuit secondary current as the thinking of their safety authorities had crystalized on 40 milliamperes as a current value perfectly safe for an operator. A new Spark Tester was then developed which did not exceed a 40 milliampere secondary short-circuit current at the highest test voltage. One great disadvantage of these new units was the fact that the short-circuit secondary current decreased proportionally with voltage, which meant that when testing at about 10 per cent of the maximum rating of the Spark Tester, only 10 per cent of the short-circuit secondary current was available. This brought us down the values which were so low that it was difficult to maintain the test voltage accurately in view of leakage and also gave a very small amount of fault current on which to operate the fault location circuit. As a result of this and also

(*Please turn to page* 247)



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Division WATCH COMPANY ELGIN, ILLINOIS

Symposium on Electrical Testing

DISCUSSIONS

Tuesday morning, October 14, 1958

MODERATOR

Alexander A. Kerr, Supt. of Production
Electrical Wire Div., John A. Roebling's Sons Corp.,
Trenton, N. J.

The seven papers comprising this symposium immediately precede this discussion period, the recorded transcripts of which have been digested to bring out essential information therein.

A member inquired as to whether the testing devices described, which are primarily for rubber and plastic materials, could be adapted to test anodized wire. Mr. Entwistle replied that the voltages used were not suitable for this type of wire, but that some years ago he had developed a small spark tester for anodized wire and since that time the General Electric Company had developed a standard unit for that purpose.

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Another question was on water tank testing and the faults it indicated. Mr. Entwistle responded to this by stating that he had checked this many times both for wire plants and the Signal Corps, and spark testing always disclosed three to four times as many faults after the water test than were found by reversing the tests. By spark testing first, the water test showed about 1/5th to 1/3rd as many as by using the water tank test first. The studies made for the Signal Corps indicated that spark testing was more efficient than the water testing.

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Mr. Slade added that it is difficult to compare the two, as water tank tests use low voltage—15 to 20 thousand for sparkers as against 3 or 4 thousands volts—and therefore water tank tests don't show up all faults. Also it is necessary to use about four times the DC to get the equivalent of AC. From negative peak to positive peak would be more representative of the DC required to be equivalent to the AC. In plotting a voltage breakdown vs. time, the AC curve falls rapidly and levels out at around half of the short-time breakdown. Under DC conditions, it levels at 70 to 80% of the short-time test, so that if applying a quick DC vs. a quick AC, the rules are not the same as for a long-time DC vs. a long-time AC.

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Mr. Entwistle commented that the usual complaint was that the quick spark test finds too many faults, so that it is necessary to not go too high in voltage. He has been interested in finding out, in the interests of wire producers, how low the voltage of a DC tester should be, because an 80,000 volt DC spark tester will cost considerably more than one with 20,000 volts DC.

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A question as to whether flexing or some other physical manipulation of the wire was done during contact with the electrode. Mr. Entwistle said they had no control over flexing after the application of the insulation. The wire goes through some right angle bends before it gets to the take-up, but between that time and the time the test is applied, under Underwriters' or Government regulations, the wire gets a considerable amount of flexing. The questioner said what he had in mind was flexing in the field of the electrode in a water DC test. Mr. Entwistle replied that nothing has been done on this, and he doubted the need for it, because if a fault is opened as a result of flexing, it will be found whether the wire is straight or bent.

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Mr. Slade said his company had developed equipment made with roller springs staggered so that wire, in going through, is pushed against the spring. The spring conforms to the curvature of the wire, giving a somewhat greater area of contact than with bead chains. On a 1" diameter cable, the contact area is fairly large, as there is some bending of the cable.

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Another man wanted to know how he could determine the location of a failure from either end of, say, a 3000-foot length of cable, so it could be patched. Mr. Huether said his company had developed a "howler," an audio signal with 400 cycles of 5 to 8 watts output. When they suspect that a conductor is broken, they feed the conductor through a ring and can pick up the break by the use of earphones or a speaker. This locates them within one inch. All conductors not under test are grounded. This can be used on cables having only a single layer of conductors. If there is an inner broken conductor or an outer shield of other cables, it won't work. Another man said they had something similar, but it was not foolproof and required a good operator. Mr. Byrnes said that the General Electric Company and the Biddle Manufacturing Company had tracer equipment for this purpose. The Biddle device is an open-end coil through which the wire is passed, a meter indicating the location of the fault. Some water tests destroy all adjacent layers, this device eliminating all that.

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Relative to limiting voltages, a questioner wanted to know wheth-

(*Please turn to page* 244)

Symposium on High Speed Dual Take-Ups

October 14, 1958

MODERATOR

Alexander A. Kerr

Superintendent of Production

Electrical Wire Division

John A. Roebling's Sons Corporation

Trenton, New Jersey

Four papers were presented in this Symposium and a digest of the recorded discussions follows these papers.

Design Requirements of High Speed Take-Up Operation

by Philip C. Greene, Sales Mgr.

Davis-Standard

Division of Franklin Research Corporation

Mystic, Connecticut

A paper presented as a part of the Symposium on High-Speed Take-Up at the Annual Convention of The Wire Association in Atlantic City, N. J., on October 14, 1958.

Properly to present our views on automatic continuous reeling of wire on dual take-ups, I would first like to clarify several fundamental considerations, as we see them, regarding the design and selection of dual take-ups in general.

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We believe a particular take-up model should be engineered and supplied to the industry to give the ultimate in operational features on a limited range of reel sizes, wire sizes and lineal speeds. A certain amount of versatility is necessary from a practical point of view; however, an attempt to handle too broad a range with one machine will necessarily result in some compromise of design, and the sacrifice of some ultimate potential feature.

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As an example of this point, we build four distinct take-up models, each intended to do the best possible job for a specific product range. The largest stand for 50" reels is only good for a maximum of 500 FPM on the heavier wire sizes. The 36" take-up is designed for the common building wire sizes at speeds to 1500 FPM. The smaller 30" stand is engineered to run hook-up wire or telephone wire at speeds to 2000 FPM, but it does not have the tension, accumulation, or cutting features to accommodate the heavy wires. The 24" take-up has its specific range and is designed primarily to handle #18 AWG and smaller at speeds to 4000 FPM.

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As far as maximum speed ratings on take-ups are concerned, there should be a better understanding in the industry of the basis for these ratings. A maximum speed rating has little value unless it directly relates to the particular job the insulated wire manufacturer wants to run, and the reels to be used. It is certainly everyone's experience that the higher the speed of the cutover, the greater the chance for trouble. Therefore, a user selecting a take-up and a maximum operating speed, must certainly take into account the potential percentage of cut-over failures, to evaluate a true maximum speed rating. Usually a successful cut-over percentage of from 97% to 98% is economically necessary to make an operating speed practical, when down time and scrap factors are considered.

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The reels being used are also important. On most take-ups in operation today, where both reels are turning at the same RPM during cutover, the maximum practical speed is closely related to the reel build-up ratio. The greater the difference between drum diameter, and full wind diameter, the greater the acceleration problem, and the lower will be the practical speed limit. In addition, the industry must learn to appreciate that the ever increasing take-up speeds demand reels of high quality and close tolerances. Reels must be

sturdy, well built, and in good condition. They must have a constant bore size within a few thousandths, and they must be sufficiently well balanced to revolve at the required speed.

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With increasing demand in the industry for higher wire insulating speeds,—in fact speeds approaching 5000 F.P.M. now possible on wire drawing equipment,—we have recently introduced and put into successful operation, a specialized new model high speed take-up for insulating small wire at speed in excess of 3000 F.P.M. At the time of this writing, a true top speed rating has not been determined, due to other items in the insulating line which presently are the limiting factors. Completely successful cut-overs at 3500 F.P.M. have been accomplished in production and all indications are that this new take-up will permit even higher rates, when other components in the line are capable of these speeds.

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To accomplish this, an entirely new concept of take-up design was necessary. We decided initially that it would be impractical to use either a single reel drive or to even use a dual drive if the reels turned at the same R.P.M. The new take-up features a dual-motor drive, permitting the empty reel to run at a faster R.P.M. and match the feet per minute of the full reel at time of cut-over. This principle, we believe, is essential for high speed work, to eliminate the problem of slack wire inevitably encountered during cut-over, when both reels are turning at the same number of revolutions, and for which instantaneous acceleration is called.

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At these high speeds, another requirement is for rugged reel support. This dictated a center support for each reel with adequate bearing size and spacing, rather than a cantilevered loads. We use a shaftless construction, with one pintle pneumatically operated to readily engage the reel and positively clamp it while running, to prevent end play and minimize vibration. The reel drive is through a gum rubber disc to eliminate the need for lining up dog pin and dog hole when loading reels. Reels from 12" to 24" flange diameter are pneumatically raised and lowered.

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With the introduction of a center reel support, it is then necessary to have positive snaggers to lock the end of the wire to both the full and empty reel in less than one-half of one reel revolution. Also the center support with its bearings, pintles, and snagger plates, which remain with it, means that there must be space between the two reel flanges, and that the reels cannot be run close together.

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This gets to one of the critical considerations for successful take-up design, which is the ability to get the wire across this required distance between the two reel flanges and positively engage both snaggers in the small fraction of a second available. Our experience indicates that it is impractical to attempt this with the traverse fork guide. In fact, even if it were possible to somehow move this guide across this distance in a minute fraction of a second, it would be difficult to insure that the wire would follow at as fast a rate. As every experienced operator knows, this instant in the operation of the take-up is the critical one, and means either success or failure.

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For a solution to this operation, we invented and have patented a device to snap the wire across the two snagger plates, independent of the speed at which the traverse fork goes across. Its operation is relatively simple and foolproof, and the mechanism consists of retractable wire guide pins which automatically position themselves over the inside flange of each reel and between the reel and the guide fork above just prior to cut-over. Upon a presignal from the automatic counter, and with the retractable wire guide pin in the normal path of wire transfer, the traverse guide moves across at a normal rate of speed to its position over the empty reel. The guide pin however, still keeps the wire winding on the full reel until the traverse reaches the end of its travel, signaling the pin to retract. This allows the wire to snap over to the traverse fork position over the empty reel, crossing both snaggers rapidly. This patented feature, we believe, is the key to successful high speed cut-over.

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There are, of course, many other operational features necessary for running at these high speeds. Without going into detail, it is important that the proper type of accumulation be included. This aspect is nowhere near as critical when the reel is turning at wire speed at the cut-over. Under these conditions much higher reel build-up ratios can be accommodated, with very litle accumulation required. Without the need for a great deal of accumulation, the number of dancer sheaves can be few, the inertia problems are minimized, and the dancer response is rapid, even with the very light tensions required by some of the fine wire sizes. Tension is readily adjustable from two to ten pounds wire pull by an air cylinder and regulator. An additional light-inertia guide sheave is also built in to absorb shock on the wire during cut-over from full wind diameter to the larger snagger diameter. The main function of the accumulator or dancer itself is primarily to control reel speed during reel build-up. The moving dancer arm actuates a potentiometer, which signals for increased reel speed, or calls for regulated braking to a slower reel speed. Also the dancer permits some latitude in the speed setting of the empty reel at time of cut-over.

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The drive for this take-up was engineered with the co-operation of the Louis Allis Company and it consists basically of two 5 H.P. eddy current clutch motor drives. While there is a tachometer generator tie-in with the capstan, this signal is used solely for setting the R.P.M. of the empty reel. Otherwise, the take-up drive functions in complete independence of the rest of the wire line. A newly developed position type control takes care of the complete range of wire

(*Please turn to page* 246)

Some Aspects of Dual Take-Up Economics and Design

by B. K. Bigland, Chief Engineer
Wire Machinery Division
General Engineering Co. (Radcliffe) Ltd.
Radcliffe, Manchester, England

As manufacturers of Cable Insulating and Testing Machines, we have for many years been investigating the possibilities of integrating sheathing and subsequent handling and testing processes for the production of plastic and rubber insulated cables. The development of a reliable high speed dual reel take-up was the first essential step towards this end.

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The early continuous take-ups we produced were merely for handling shop reels and for line speeds in the region of 1,000 ft/min. Two points were immediately obvious; firstly if the cable was to be rewound in a subsequent operation the lengths collected at the Extruder should be as long as possible to save down time on the Re-winders; secondly, that if the cable was being collected in long lengths on large reels it was difficult to economically justify a fully automatic machine, the only saving was in shut down time on the Extruder, and consequent saving of waste.

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We had then two alternatives, either to produce a dual take-up which was as simple and low priced as possible, or to produce a fully automatic machine which would cut out re-winding altogether and which could then be an economic proposition even if designed along machine tool lines. The labour costs incurred during sheath extrusion were virtually negligible, but the handling costs incurred later were a very different proposition. There were many other gains to be made in producing a fully automatic take-up, with regard to reducing faults due to handling, saving

B. K. Bigland

This paper was presented as a part of the Symposium on High Speed Dual Take-Ups at the Annual Convention of The Wire Association in Atlantic City, N. J., on October 14, 1958.

The take-up mechanisms described in this paper, the author stated, are covered by patents in all principal countries. They are of interest in that they differ so materially from the standard types of dual take-ups manufactured in this country.

packing materials and space, obtaining more accurate despatch lengths and so on, which will be described more fully later. The capacity of such an automatic, however, was potentially so large that for many domestic and wiring cables, it would be limited by the Extruder capacity and for larger cables would be more economical as a Re-winder. For this reason we decided to produce two types of dual take-up. A simple but reliable machine, and a fully automatic unit.

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Whilst building our first dual take-ups, we had collected considerable data on the dynamics of the machines, and encountered a number of problems. We used a cine-camera to record the action of moving parts and the wire path during transfer from the full to the empty head, and we have two short films taken for this purpose, condensed versions of which will be shown to you later, showing respectively a continuous Reeler with automatic loading and unloading for switchboard wire which presented particular problems relative to tension control, reel build-up, reel speed, and wire speed and a continuous coiling machine.

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The main problems we found were:

(1) **Obtaining a low running tension at high wire speeds with a potential in the region of 5,000 ft/min.**
(2) **Preventing increases in tension during change of the wire from the full to the empty reel.**
(3) **Preventing the bottom layer of wire from being damaged.**
(4) **Preventing the cut wire end from damaging the incoming wire.**
(5) **Locating reels which might be unbalanced in such a way that we could run them up to 2,500 r.p.m. and subject them to high acceleration, braking and out of balance loads.**
(6) **Developing a counter unit which would be 100% reliable at speeds up to 20,000 counts per minute, and which would not 'lose' part of the count during rest to zero at changeover, and taking a minimum of power to drive it.**
(7) **Creating a design which was versatile enough to be used as a reeling or coiling machine which could quickly be changed for different sizes of reels or coils by an Operator with no mechanical knowledge.**
(8) **Integrating as many operations as possible to keep down the load/unload cycle time of the machines.**

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The first four problems were common to both the simple and

automatic machines, and occupied most of our research.

* * *

To obtain a low running tension it was necessary to keep the length of wire in storage to a minimum, the wire run as simple as possible, and to reduce as far as possible the inertia of guide sheaves and the power required by the Measuring Machine. See Figure 1.

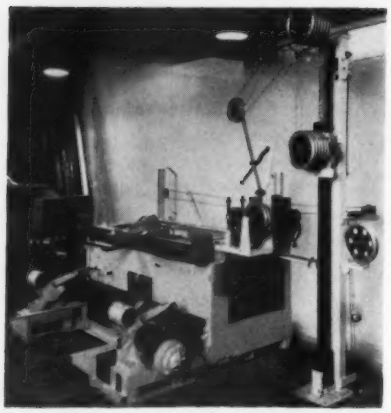

Fig. 1—Early model 'T' Class dual reel. 24/30.

You will note the complicated Accumulator system on the early machine, and the way in which this was altered to correct the wire run on later models. See Figure 2.

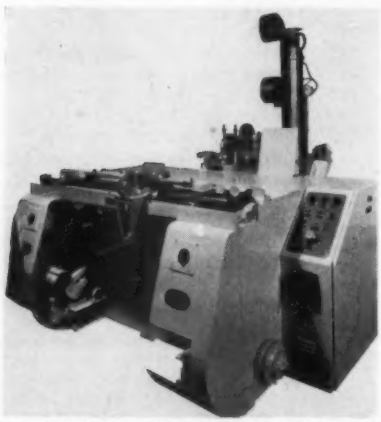

Fig. 2—Latest model 'T' Class dual reel. T. 24/30.

To maintain a sufficiently small wire storage meant having a power capacity of at least 10 h.p. available for acceleration to reduce storage time, although the normal power requirement was only in the region of 2 h.p. This was assuming that we accelerated both full and empty reels together. An alternative was to drive the reels separately, so that the barrel of the empty reel ran at the same peripheral speed as the incoming wire, but there were four serious objections to this:— firstly, that if the reel build-up was say 3:1, the flange of the empty reel would then have a peripheral speed three times the wire speed, and if the wire was allowed to touch it and skid, the wire might be cut; secondly, if the wire were gripped say by snagger plates on this flange it would be snatched and would cause a fluctuation in the Accumulator, thus increasing tension uncontrollably; thirdly, it would only be possible to change over from one fixed diameter to another, whereas we needed to change from a barrel to a barrel or at any desired length on the full reel, and also to accommodate various reel sizes and ratios without the Operator having to adjust the drive; fourthly, we wanted to reduce the winding tension to as near to zero as possible during acceleration and locking to avoid velocity changes in the guide system, and to prevent the layers of wire covering the crossover wire being deformed. Since these conditions could only be met by accelerating both reels together, we decided to use a common drive and after experimenting with variable speed motors and electric couplings, we decided a hydraulic drive was the best proposition driven by a constant speed motor. The reasons for this were that it was an extremely expensive proposition to obtain the control relationships we required electronically, and secondly that using the rotor of the constant speed motor, which did not change speed, as a flywheel gave us bi-directional control and eliminated 'hunting' during and after changeover.

* * *

This drive system is common to all our high speed take-ups, and overcomes the major part of the first four problems. See Figure 3.

* * *

Damage to the cut end was avoided by using extremely powerful brakes to give a high degree of retardation, on the full reel immediately after cutting, which prevented the full reel tending to unwind and the loose end touching the incoming wire. The power taken by the measuring machine was reduced by using a single low inertia counter on the simple machine and an electronic transistor pick-up on the automatic unit together with a Decatron counter.

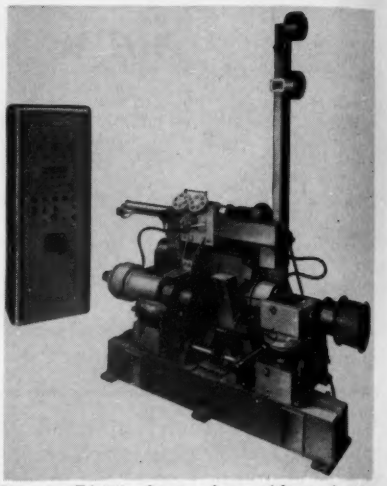

Fig. 3—'TA.15' front view without loading mechanism.

* * *

The remaining points were concerned solely with the automatic machines.

* * *

Locating Reels. Very few of the reels available in Cable Factories, certainly in Europe, have been designed for use with high speed automatics and since scrapping existing reels meant high capital cost, we had to find a locating system which would not only grip the reel but support it. We decided to use self-centering air operated chucks which with various jaw designs allowed us to hold the reels by their flanges or by the braking ring sometimes fastened to the drum bolts, or by expanding the jaws into the bore. See Figure 4.

* * *

This system allowed us to ignore common variations in drum bore and to use standard reels. An adaptation of this chuck permits accommodating of a full range of plywood and cardboard reels varying from 6" to 15⅞" flange diameter and 2¾" to 6" traverse, the chuck being set to the required size merely by moving a lever slotted for each reel size, this can

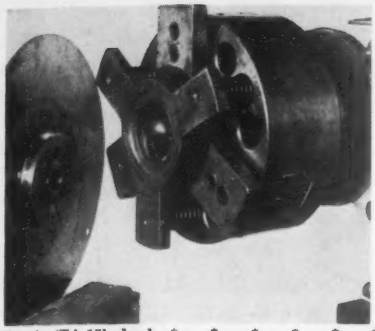

Fig. 4—'TA.15' chuck. * * * * * *

be done in a few seconds by the Operator. See Figure 5.

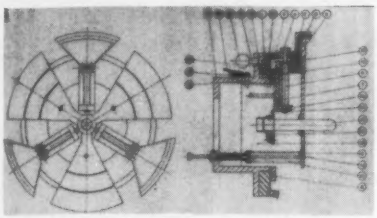

Fig. 5—Adjustable chuck for cardboard reels.

The coiling heads for continuous coiling are also held in the same chuck so that the machine can be changed from reeling to coiling in a few minutes.

★ ★ ★

Length Control. The continuous take-up offered an opportunity of increasing accuracy on despatch lengths with consequent material savings, since there was no acceleration and braking between lengths. There was the problem of finding a counter which would batch continuously at a batch rate up to 10 per minute which would reset without stopping counting, and would count at least 20,000 counts per minute so that small length intervals could be set. The reset question became increasingly important with higher speeds. We could find no existing counter to perform this duty and so developed a special Decatron unit which would meet this specification. See Figure 6.

★ ★ ★

This counter can be provided with any number of decades and three selections are made during the count, for empty reel start, changeover and reset, and cut. The three settings are made on three banks of switches operating from a single counting head. It is necessary to have variable control of

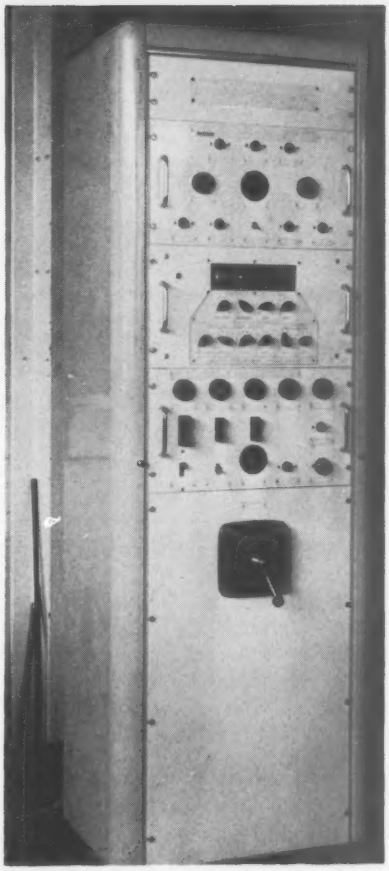

Fig. 6—'TA.15' control panel, front view showing Decatron. * * * * * * * *

these three operations if cycle times are to be kept to a minimum on despatch winding.

★ ★ ★

Versatility. You will note from the comments made previously that the drive will accommodate considerable variations in diameter, that the machines can quickly be changed over a wide range of reel sizes, and that the same machine can quickly be adapted from reeling to coiling. It was this same consideration that decided us to adopt a design with horizontally swinging turrets, and to develop a coil unloading and tying device to operate in this plane on our automatic machine. See Figure 7.

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Integrating Operations. Once started on a fully automatic machine, we found that it was almost impossible economically not to integrate all attendant operations in the machine. Most simple of the automatics, is the automatic Reeler

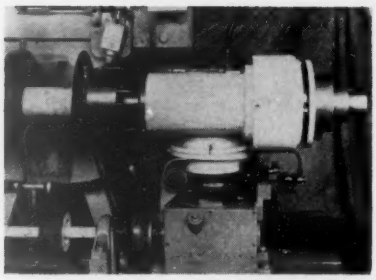

Fig. 7—'TA.15' close up, turret head. * *

for switchboard wire. See Figure 8.

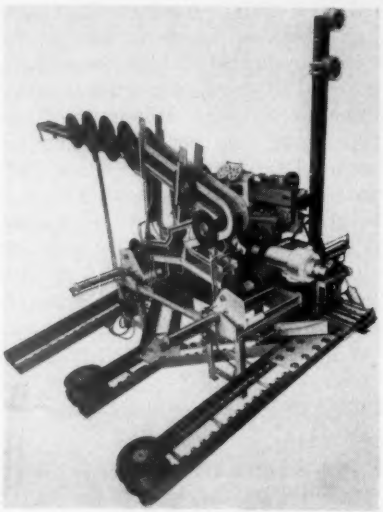

Fig. 8—'TA.15' with load/unload mechanism. *

On this machine the reels are loaded and unloaded automatically. The incoming reels being fed from a centre stepping mechanism and the outgoing reels being delivered down three chutes, the reels in the outer chutes having fully tested wire going directly to the twinning machines, the centre chute collecting reels containing faults and needing rewinding and repair. A selector mechanism in the outgoing chutes directs the reels with Spark Test, bare wire or diameter faults, into the centre chute. The reels are delivered with their flanges horizontal to prevent the wire unwinding and facilitate conveyor handling if desired. The total cycle time from one reel onto the next occupies less than 40 seconds, which means that the machine can deliver a finished reel every 40 seconds if required. In fact, on P.V.C. the particular machine shown runs 2 mile lengths at 2,400

ft/min. which means a reel every four minutes approximately.

★ ★ ★

The reels themselves are 3¼" barrel dia. 10⅞" o.d. and 5" wide, and of riveted construction with wooden barrels, having to run at a top speed in the region of 2,500 r.p.m. The minimum wire size is .016" diameter core with 8 radial mils P.V.C. insulation.

★ ★ ★

This then was a typical example of the dynamic problems mentioned, with a large reel diameter ratio, a small conductor needing light tension handling and a reel with a barrel which would be cracked if not supported against dynamic stresses. Machines of this type have now been operating for some 12 months on three-shift duty, and have been tested to considerably higher wire speeds. Apart from increased output and elimination of the bulk of rewinding, the lengths are accurate to better than 1/20 of 1%, the wire lay is improved, and the fault level reduced compared to previous methods.

★ ★ ★

We have now produced several machines of this model for larger reels and of course dynamically the larger the reel, the easier the problem, since out of balance loads, changes in r.p.m. relative to wire speed and consequently power requirements are all reduced.

★ ★ ★

The automatic reeler has all the basic requirements for continuous coiling, the only additions being the collapsible coiling heads and a modified form of cutter.

★ ★ ★

The coiling heads shown are designed for either hand or automatic unloading and tying, and are held in the reel carrying jaws on the machine. See Figure 9.

★ ★ ★

The main problem here is cycle time since there is no real limit to the line speed, and up to the moment we have run these machines on 100 yard coils at a rate of 4 coils per minute, or 400 yards/min. and on 200 yard coils at 800 yards/min. We hope with further developments of our automatic unloader and tying device to increase this production rate considerably.

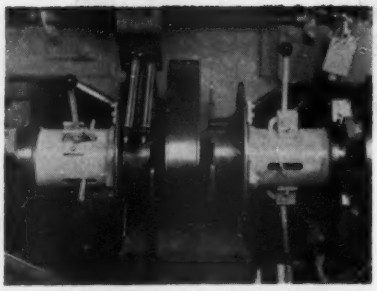

Fig. 9—'TA.15' with coiling heads, close up.

★ ★ ★

The turret heads on the coiling machine swing through only 45° and the coil is removed by a three jaw arrangement before tying to allow the empty coiling block to return immediately to the winding position. Two coil removing and tying devices are provided to double the time available for tying the coil. All these items helping to reduce the cycle time.

★ ★ ★

The tying device itself is perhaps of interest, and consists of a three jaw clamp entering through the slots in the coiling block gripping the coil, and removing it as the outer flange of the block collapses. The coil is then drawn through three fixed banding positions provided with tape rolls, the inner end of each tape being fixed so that as the coil passes through them the tapes are pulled round three sides of the coil. Final closure is then effected by stapling heads which fix a double row of staples in the tape, and cut between them, thus leaving the tape continuous ready to tie the next coil. As the closure is effected, the coil is pulled back and released into a chute which can either feed it into a box or onto a Conveyor. The chute is pivoted and connected to the cable testing equipment to separately deliver the good and faulty coils.

★ ★ ★

The tying device is self-compensating for various sections of coils since it merely pulls from the tape roll the length required to bind it.

★ ★ ★

We are at present developing a film packing unit to collect the coils from the chute, seal them between two transparent film, print the core type and advertising data on the pack, and deliver a continuous strip of coils from the machine, so that they can be fed directly to the stores.

★ ★ ★

Perhaps the most interesting example of integrating various operations is our cardboard reel packing machine. This is a completely self-contained unit which delivers packed cartons of reels direct from the extruder line. See Figure 10.

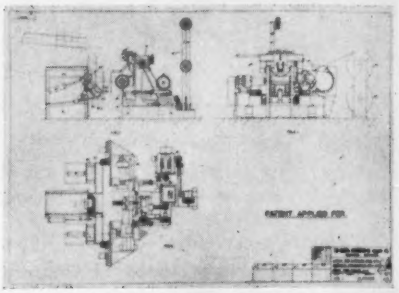

Fig. 10—Assembly of cardboard reel packing machine.

The operations performed by this unit are:

(1) **Selecting empty reel.**
(2) **Printing core type and data on reel flange.**
(3) **Loading the reel and returning carrier.**
(4) **Batching the wire continuously and automatically into any preset lengths.**
(5) **Fitting a card surround band between the reel flanges and fixing it.**
(6) **Separately delivering good and faulty reels of cable, the test equipment being built into the line.**
(7) **Elevating the reels to working height, and pushing them directly into a carton if required in batch quantities.**

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The first three operations occur simultaneously, and all remaining operations are made during continuous winding. We are at present constructing a number of these machines, and estimate a cycle time of some 20 seconds per reel.

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The machine has to handle some 15 different sizes of reels, varying in diameter from 6" to 15⅞"; in

(*Please turn to page* 242)

The High Speed Dual Take-Up

by O. Minardi, Chief Engineer
Entwistle Manufacturing Corporation
Providence, Rhode Island

The High Speed Dual Take-Up may be generally defined as a modern version of Continuous Take-Up Equipment permitting efficient extruder line operation at speeds up to 3,000 feet per minute, and maintaining by itself the potential for higher speeds.

★ ★ ★

The importance of providing for these general conditions in the design of a High Speed Dual Take-Up is evidenced by the fact that many lines have been in operation for years with extruder and capstan speed capacity limited by relatively obsolete take-up equipment. Greatly increased continuous pay-off speed potential has been provided for in many installations with the increased use of Continuous Dead-Reel Pay-Off Equipment. This leaves these many installations needing only an efficient High Speed Dual Take-Up to permit continuous production at high speeds. It therefore stands that the modern High Speed Dual Take-Up, if it is to keep pace with the increased demands for productivity, must be designed to **more** than satisfy the present requirements for speed in either existing lines or new installations.

★ ★ ★

The design for speed, however, does not alone provide for increased production. It must be coupled with such equally important factors as; Control, Proper Automatic Operation, Serviceability, and Safety in Operation. In this paper, I shall discuss these main requirements for a successful high speed operation as they were presented to our Design Group at Entwistle Manufacturing Corporation by our field representatives and associates in the industry, and our design approach in each category.

This paper was a part of the Symposium on High Speed Dual Take-Ups at the Annual Convention of The Wire Association in Atlantic City, N. J., on October 14, 1958.

Speed

The general requirements for speed have been stated at the opening of this paper, and must necessarily be considered of prime importance. The main design consideration, therefore, must be to equip the Take-Up to best withstand the operating conditions resulting from high speeds. For this reason we have centered our design around the "shaftless" construction, and thus acquired the stability of bearing support at both ends of each reel.

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The importance of this type of bearing design becomes more evident where increased reel weight and size are necessary at high speeds, or where existing reels to be used have inadequate bores unable to accommodate the shaft size required on cantilevered shaft-type equipment. Further, by pneumatically controlling the shaftless reel carrying arms, the operator's time and effort necessary to load and unload reels has been minimized. In order to retain the wire ends at "crossover" and provide for cutting between reels, "snagging" discs have been designed as an integral part of the center bearing assemblies to overcome the problems resulting in this phase of operation from the fixed center bearing support inherent in "shaftless" construction.

★ ★ ★

In providing for the drive speed potential, provision must be made to have available an adequate reserve of horsepower to each reel. This must be instantly available at "cross-over" to keep at an absolute minimum the time necessary for acceleration of the empty reel, and to minimize the amount of wire storage necessary for successful continuous operation at high speeds. To best satisfy these requirements, we have provided for a separate controlled drive to each reel.

Control

The most important control requisite must be to maintain a proper wire tension throughout the winding operation, regardless of speed. To effect this, the independent reel drives outlined above are controlled by voltage signal reflecting the reservoir lower sheave position and provide for immediate drive response. Any change in the reservoir lower sheave position, resulting from the relation of take-up speed and the constant wire speed maintained by the line capstan, signals for the take-up drive changes necessary to maintain complete control. Tension, regardless of speed, is maintained by the reservoir lower sheave assembly, since it remains in a free position throughout the winding and can be controlled to set its most effective running height at any speed.

★ ★ ★

Infinitely variable traversing, with immediate and smooth response at each reversal, is effected through the use of hydraulics.

Proper Automatic Operation

To best provide for proper automatic operation, and to reduce the complexity of installation to a minimum, the High Speed Dual Take-Up must be supplied complete with its necessary auxiliary equipment. Our approach to satisfy this requirement, is to supply the following auxiliary equipment, each be-

(*Please turn to page 240*)

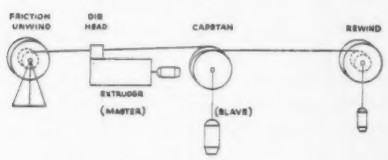
A Coordinated Wire Coating Line

by Harry J. Bates
Application Engineer
Reliance Electric and Engineering Company
Cleveland, Ohio

This paper was presented as a part of the Symposium on High Speed Dual Take-Ups at the Annual Convention of The Wire Association in Atlantic City, N. J., on October 14, 1958.

Mr. Bates attended the Case Institute of Technology, spent eleven years with the Ohio Bell Telephone Company, interrupted by four years in the Army as a chief warrant officer in communications work for the intelligence service, and then joined Reliance in 1953. His background includes field service in the plastics, rubber and wire industries and his present work is in the wire and plastics section of his company's Application Engineering Department.

The manufacture of coated wire requires at the minimum a line of four sections. These are the extruder, which extrudes non-rigid polyvinyl chloride polyethelene, or other coating agent, the capstan which controls wire speed, the payoff and the reel. The payoff, which may be as simple as a friction backstand, and the reel, control wire tension, but do not set line speed nor do they control the thickness of coating. (See Sketch 1.)



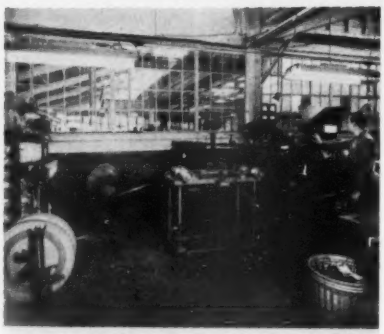
BASIC SYSTEM
SKETCH # 1

To control satisfactorily line speed it is obvious that the capstan must provide a positive drive.

★ ★ ★

A common type of capstan is shown in photograph No. 2. It consists of a drum around which are wrapped several turns of wire or cable. Having thus provided a large area of surface contact, a minimum of wire tension is required to provide a positive drive.

Typical single-capstan extruder line
Photo No. 2 * * * * * * *



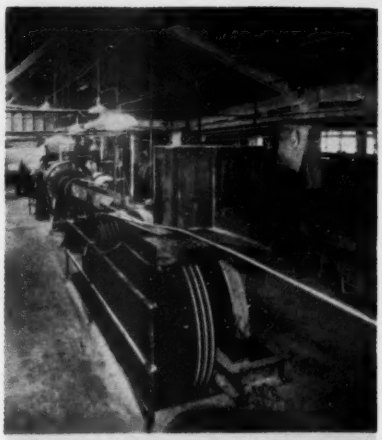
Dual-metering capstan employed as hold-back

Dual-capstan and wind-up
Photos No. 3 and 4 * * * * * *

To eliminate the chafing action resulting from the lateral traverse action of the wire across the capstan face dual capstans are often provided. These consist of a grooved driven capstan and a series of idler sheaves. Several samples are shown in photographs 3, 4, & 5.

★ ★ ★

This again requires wire tension to obtain a positive drive.



ual-capstan extruder line, running from left to right
Photo No. 5 * * * * * * *

Another type is the tractor capstan, which is often employed with larger cable. This consists of two driven tractor like belts driving the cable which passes between them. High friction pad like treads and a minimum of pressure provide a positive drive.

★ ★ ★

A similar arrangement utilysing pressure to ensure a positive drive is the belt capstan.

★ ★ ★

Any of these may be satisfactory but it is important to note that both the single and dual capstan will slip if tension is lost.

★ ★ ★

The poundage of any compound extruded per hour is influenced by many factors. These include the type of material, the extruder temperature, the die size and shape and the extruder speed. Close temperature control with the modern extruder results in the volume being a function of extruder speed for any given combination of material, die, etc.

★ ★ ★

The volume extruded per second

is distributed over the footage of wire per second which passes through the die head and establishes a given coating thickness. Any change in either the extruder speed or wire velocity consequently changes the coating thickness.

★ ★ ★

It is, therefore, highly desirable, from a quality standpoint, to hold the speed ratio of the extruder to the capstan constant. It is also highly profitable. A 2% variation in coating thickness, would require more than 2% excess material per hour, day and year, to safely maintain the desired minimum coating thickness. A 2% or more variation, is not uncommon, and if reduced to .5% or better, substantial savings are the result.

★ ★ ★

As an example, consider a 3½" extruder coating 200 lbs. of non-rigid p.v.c. per hour. This material costs approximately 36c per lb. If we can save 1½% on material, then this would amount to $8.64 per 8 hour day, or better than $2150.00 per year.

★ ★ ★

Automatic gauge controls have entered this field and not only indicate coating thickness, but in most cases can effect a correction by changing the capstan or extruder speed. These are excellent devices for monitoring and correcting slow changes in gauge, whether due to variations in raw material and heating, or to drifts in drive motor speed.

★ ★ ★

They are, however, far enough removed from the extruder, and slow enough in action to be of little help during transients occasioned by roll transfer, erratic winder traverse, rapid tension variations, etc.

★ ★ ★

A coordinated drive system consists primarily of two separate drive systems, the extruder being the master section and the capstan a slave unit following at a preset speed ratio.

★ ★ ★

The extruder drive may be strictly a constant torque design, or may be modified by some constant horsepower range at the higher speeds. An extruder producing a single product, or a group of products with a common range of torque and speed requirements, would present a constant torque demand. Conversely, units covering a wide range of products and materials can utilize some constant horsepower range at a substantial reduction in initial drive cost. Comparison of the driving requirements for rigid polyvinyl chloride, which requires high torques at low speed, and polyethylene which is usually extruded at higher speeds but at reduced torques, illustrates the point.

★ ★ ★

The Adjustable Voltage Direct Current system is employed in which the plant a-c. supply is spot converted to direct current at the machine site. The drive motor speed varies directly with the armature voltage of the generator, which is controlled by varying the excitation of the generator field. This is accomplished by an electronic panel, which at a linear rate increases or decreases the generator field excitation to secure the generator armature voltage and hence the drive motor speed preset by the operator. If a range of constant horsepower is provided, the upper range of the operator's speed potentiometer causes the electronic panel to control the motor field, achieving the higher speeds by sacrificing torque capability.

★ ★ ★

The capstan drive is a second adjustable voltage direct current system controlling the capstan entirely by armature voltage. A high gain electronic regulator excites the capstan generator as required to maintain the desired master-slave relationship. The motor speeds are sensed by tachometer generators mounted on both the extruder and capstan drive motors. These produce signal voltages precisely proportional to the motor speeds.

★ ★ ★

The operator establishes a speed ratio by adjusting the portion of each tachometer generator output which is to be presented to the regulator input. These voltages are added algebraically and fed into the high gain electronic regulator. Since the regulator is essentially a zero balance device, no more than a few millivolts of control signal are required to closely maintain the selected speed ratio.

★ ★ ★

The motor generator set with its inherent ability to regenerate is used to provide an overall system which can provide a fast transient response in the decelerate as well as the accelerate direction.

★ ★ ★

As previously mentioned, gauge controls are often incorporated with such a system to provide a corrective action. This is accomplished by permitting the gauge control to gradually readjust the speed ratio if the desired gauge is not being maintained.

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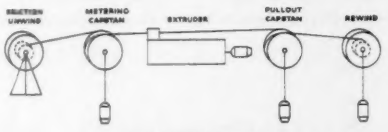
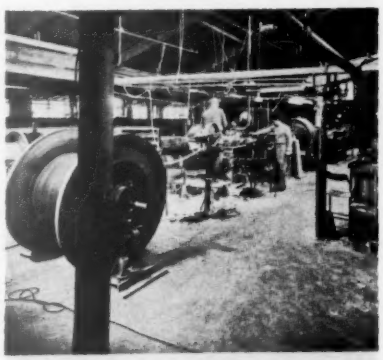
Most cable coating lines and some wire coating lines utilize a pull-out capstan, as well as the "slave unit" or metering capstan. See sketch #6 and photograph #7.



DUAL CAPSTAN SYSTEM
SKETCH #6



Dual-capstan extruder line, capstans in foreground

Photo No. 7 * * * * * * *

With this combination, the metering capstan is mounted between the supply reels and the extruder and again regulates wire speed. The pull-out capstan is tension controlled by regulating its motor current and is of great assistance in maintaining the cable centered in

the die head.

* * *

The metering capstan in this case must not only pull wire from the supply reels, but must hold back against the pull-out capstan. The balance between the forward and back tensions determines whether it consumes power as a drive motor or, as a drag generator, pumps power back to the a-c. line.

* * *

Reel control of almost every type has been used following an extruder capstan line. Both constant torque and constant tension approaches have been employed using direct current systems, slip clutches, mechanical and hydraulic systems. It is beyond the scope of this paper to discuss the relative merits of the many types of winder control systems.

* * *

It should be recognized, however, that a satisfactory take-up must meet the following requirements:

1. It must make an acceptable package.
2. If a single or dual capstan is employed, a sufficient tension must be held to maintain capstan control of line speed.
3. Tension must not increase to the point where elongation of the wire and loss of gauge result.

Dual wind-up on single-capstan line
Photo No. 8

* * *

In photograph 8 a dual windup is shown following a single capstan unit. With no dancer roll in evidence it is probable that some momentary loss of tension and change in gauge occurs with every transfer.

* * *

Regardless of the number of sections or type of control, uniformity of product gauge rests on the ability to maintain constant the preset ratio between the extruder and the metering capstan.

* * *

Close tension control and a minimum of transients may make this problem easier, but in any event is secondary to the fundamental master-slave relationship of the extruder and capstan.

* * *

With the wide range of materials in use and the still unknown compounds in the laboratory stage, the future horsepower requirements and degree of control required remain an open question. In view of this, and the relative cost paid for compounds being handled, the additional capital outlay to obtain a versatile drive system becomes a good investment.

DISCUSSIONS

Symposium On High Speed Dual Take Ups

October 14, 1958

MODERATOR

Alexander A. Kerr, Supt. of Production

Electrical Wire Div., John A. Roebling's Sons Corp.

Trenton, N. J.

The discussions following the presentation of the four papers comprising this symposium, which immediately precede these discussions, have been digested to present essential information.

Mr. Bigland pointed out that usually in any type of dual take-up or capstan system, it is considered that tension must be maintained at all times, but he believes that this is not necessary. For large conductors the take-up need exert no tension at all. A questioner asked if the accumulator took up all of the wire between spool changes, to which he replied that the amount of wire depended upon how much horsepower the machine had.

Mr. Greene was asked about the weight of wire on the particular 36" reel he showed. This was, he said, 2,000 pounds. He also received a question on the material used to coat the measuring wheels, which he said was "Disagren," produced by a concern in Jamaica, N. Y.

* * *

Asked if they used the take-up on bare wire following a drawing machine, Mr. Greene stated that their take-up was designed primarily for insulated wire.

* * *

Regarding the package unit which included a decatron counter, Mr. Bigland was asked if this device had storage and read-out facilities for fault counting. He said the one he referred to controlled

the take-up, but another decatron counter was built into the spot tester that had read-out facilities which can be pre-set for fault levels, if desired. If the wire is not to be rejected for one fault, there will have to be testing afterwards, depending on the level. Another detector is built into the sparker to distinguish between pin holes, etc., and bare wire.

★ ★ ★

A member said the possibility of having a deflector introduced ahead of the snagger to bring the point of tangency past the drum had been discussed. He wanted to know if this was to reduce the tug on the wire at snagging time. Mr. Bigland replied that a tug on the wire in the take-up is inherently wrong. When snagger plates are used, there is cross-over and acceleration, and the wire is transferred to the other reel before it goes into the snagger plates. The wire loop spins freely around the reel, both reels running at the same speed, until acceleration is finished and the machine pulls the wire back into the snagger.

★ ★ ★

Mr. Greene added that they had this on their machine—an arm independent of the rest of the equipment. During the accelerator cut-over, the arm dips. While there is some tug on the wire, it is kept at a minimum. It can be regulated to a point necessary to keep the wire just tight enough for the winding wanted.

★ ★ ★

A member remarked that a 26 or 28-gauge wire is fragile, and the tug is difficult to make light enough, even with a Nylon pulley. Mr. Greene agreed, but said so far they had had no misses. If you have to move all the accelerator sheaves, there is bound to be some tug.

A question as to why they had not worked with bare wire was answered by Mr. Bigland by his saying it was just a matter of economics; this machine was too costly for a wire drawing operation. There is a double block system in drawing machines that cannot be used on plastic insulated wire, where one can use a storage block.

★ ★ ★

Mr. Greene was asked if on small sizes of wire, which necessarily have to be wound by tension, whether for some types of insulation such as the semirigid, there isn't a tendency to slip and of centrifugal force, at the speeds discussed, giving a soft, mushy reel. Mr. Greene said the tension had to be regulated for the type of wire—what it could stand. It has to be high enough to overcome centrifugal force. So far there has been no difficulty. At 5,000 fpm, the reels are very small, but so far they have not tried this speed.

★ ★ ★

Another question to Mr. Greene was whether, at 3,000 fpm on 15,000 foot lengths of wire, the switch-over could be accomplished accurately and without much waste of wire. He replied that on the first reel there is some loss of footage depending on the time necessary to retract the pin. The signal for the traverse can be pre-set ahead of the pre-count set. From there each repetitive reel will follow the same procedure, as retracting the pin will take the same time. The switch can be made from any position of the wire when the signal comes.

★ ★ ★

As to whether any problems arise from winding wire on a new reel over an initial layer that is starting, as to reels, Mr. Bigland replied that in the take-up shown on the film, they had a build-up of just 3 to 1. The bottom wire can be deformed in the change-over, which is why they have no tension during acceleration. It could also occur when a reel is being wound, as each extra layer puts extra pressure on the bottom. For this, the wire tension controls proper build-up.

★ ★ ★

A member asked if the end of wire sticking out would keep dragging along while being transferred, and how could the first end be kept out to prevent deformation of the wire being wound along the far end of the reel. Mr. Bigland said he believed that on low tension winding of PVC, this would not be a problem. With polyethylene it is different. On most winding jobs for PVC and switchboard wire, there is no need for a water test when the cable is assembled afterwards. On polyethylene the end of the wire must be left out. The end is needed for testing and it is for that that stagger plates are used and no change-over to the far side of the reel is made. On the PVC machine shown, the wire was crossed right over.

★ ★ ★

Mr. Greene added that it was important that the traverse not go too far into the empty reel, as long as there is a long wire to wind on, or it will slip down and give loose wraps or pull the end of the wire out of the snagger plates. It should stay as close to the empty reel flange as possible to minimize the problem. Also, sufficient tension is needed to insure not having several loose ends at the bottom of the drum, or there will be loops and foldovers that can deform some of the insulation.

MEMBERSHIP IN THE WIRE ASSOCIATION HAS MANY ADVANTAGES

These are described in a booklet: "The Wire Association — What It Is and How It Functions." It will be mailed to you on request.

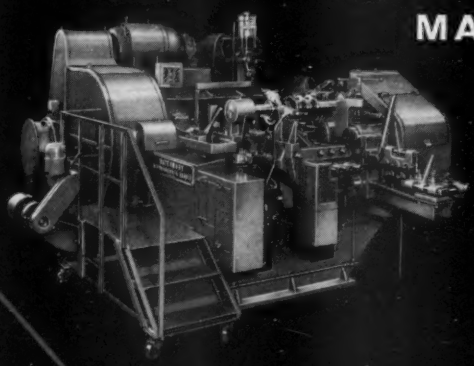
All wire men concerned with production or processing problems are eligible to become members. Send for the booklet.

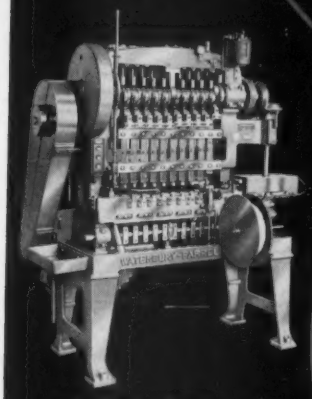
THE WIRE ASSOCIATION

Richard E. Brown, *Executive Secretary*

453 MAIN STREET • **STAMFORD, CONN.**

COLD HEADING
MACHINERY





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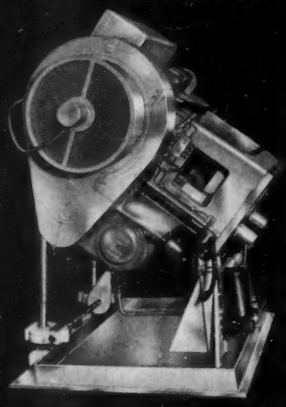
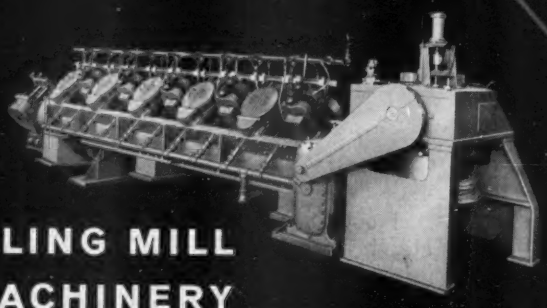


EYELET,
SLITTER
& WIRE
MACHINERY



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WF-55

How to Solder Cable Eyes

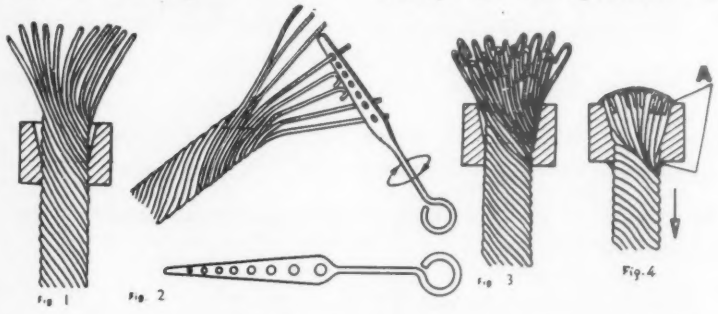
Since the ends of tension cables are subjected to great stresses, the correct soldering of the eyes is important. The method illustrated here, published in "Technica", Switzerland, in August, 1957, p. 1011, to whom credit is acknowledged, provides cable ends that can stand permissible loads on the cable.

★ ★ ★

The cable eye, provided with a conical bore, is slid over the end of the cable previously cut to a length with an additional centimetre of wire coated with tin (Fig. 1).

★ ★ ★

The cable strands are separated and bent with a tool as shown in Fig. 2. The tool is a flat piece of steel with holes of various diameters to fit different gauges of wire. The result of bending the ends is shown in Fig. 3.



The cable end, now larger, is pulled into the conical bore of the eye, where it is firmly clamped. The junction is then coated with solder (A) which fills all hollow spaces (Fig. 4).

—Courtesy of "Technica", Switzerland.

Do you have how-to-do-it items for this department? To make it a success we are depending on readers to send us material drawn from their own experience and observation. Your cooperation will be appreciated by us and our many readers.

Obscure Wire Plant Machinery Installation Directions

Not long ago this writer stepped into a wire manufacturing plant and found the chief engineer officiating at the installation of a gadget. An assistant was doing the installing with the aid of a wrench and screwdriver. The chief was watching his assistant and at intervals was looking at a paper in his hand which the writer learned contained the installation instructions.

★ ★ ★

After the bolts and screws were all in place they "tried it out" and found that the device "didn't work". Obviously, it wasn't installed properly, yet the instruction sheet had been followed as closely as was possible. Curse words flowed copiously from both of the above-mentioned participants.

★ ★ ★

The chief handed the instruction sheet to the writer saying, "You are a college graduate. What do you make out of it?" The writer read every word, studied the drawing on the sheet, went over the jumbled figures, and finally admitted that he was puzzled and couldn't see that the installation was improperly done. The writer informed the chief that the writer has not been sufficiently educated to understand such an instruction sheet as that. It was printed in the English language, yes, but it didn't make good sense—to the three of us at least. It was the best example of a poor instruction sheet this writer has ever seen and he would like to reproduce it here but that, of course, would not be allowed.

★ ★ ★

It is exceedingly foolish to send directions with wire making machinery or devices that are not perfectly clear, yet it is done all too frequently. To prepare instructions carefully may take a little extra time, that is true, but the effort is usually well worth while. The above chief engineer "thought" he was following the directions properly. He was careful, and this writer knows that by nature he is a cautious and conscientious man. But, due to the poor job of preparing the directions he went wrong and it was necessary to remove the bolts and screws and do the job all over again. In fact he was obliged to "figure it all out himself" in order to do the installing in such a way that the machine would perform. The instruction sheet was not only poorly done, it caused the installer to do the installing incorrectly. It was therefore worse than no installation sheet at all.

—Courtesy of W. F. Schaphorst

WIRE ASSOCIATION MEETINGS FOR 1959

APRIL 29-30—NON-FERROUS DIV., ELECTRIC WIRE & CABLE SECTION Regional Meeting: Statler Hotel, Boston, Mass.

Program Chairman: URBAIN J. H. MALO, *Technical Director*, The Crescent Company, Pawtucket, R. I.

MAY 7-8—FERROUS DIVISION Regional Meeting: Shamrock Hotel, Houston, Texas.

Program Chairman: WILLIAM L. DULL, *Superintendent*, Wire Mill, Sheffield Div., Armco Steel Corp., Houston, Texas.

JUNE 4-5—PACIFIC COAST REGIONAL MEETING, Fairmont Hotel, San Francisco, Calif.

Program Chairman: LLOYD W. ALBRIGHT, *Manager* of Wire and Hardware Sales, Pacific Coast Div., The Colorado Fuel & Iron Corporation, Oakland, Calif.

OCTOBER 12-15—ANNUAL CONVENTION OF THE WIRE ASSOCIATION, Statler Hotel, Cleveland, Ohio. Meeting of all divisions.

General Program Chairman: WALTER B. McSHANE, *Chairman*, Wire Committee, American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio.

Ferrous Program Chairman: GORDON T. SPARE, *Research Project Engineer*, American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio.

Non-Ferrous Program Chairman: DAVID M. SCHMID, *President*, Techalloy Co., Inc., Rahns, Penna.

o

Full details regarding these meetings will be published in WIRE AND WIRE PRODUCTS in advance. Association members also will receive reservation cards and program data by mail.

All wire men are cordially invited to attend. If not a member, hotel reservation cards will be mailed upon request to Association headquarters.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

•

453 MAIN STREET **STAMFORD, CONN.**

Wire Kinks

Facts About Sieves and Testing

Every once in a while we read articles on testing sieves and testing products in which the 325 mesh sieve is mentioned as being the finest sieve used. This leads the writer to believe that possibly many sieve users do not know that there is a sieve of 400 mesh made in the United States and which is claimed by the manufacturer to be the finest in the world. This sieve is woven of wire that is exactly one mil or .001" in diameter. The size of the opening is therefore 0.00167" by 0.00167" as may be readily computed because 400 wires each .001" in diameter take up 0.4 of an inch. Hence six tenths of the inch is open space.

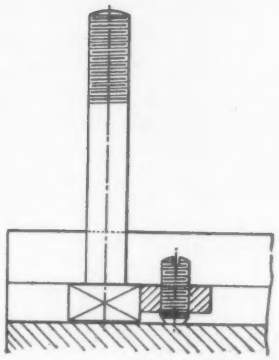
★ ★ ★

An interesting fact about wire only one-thousandth of an inch in diameter is that if you will cut off a piece of that wire one-thousandth of an inch from the end you will have a piece which has a projection area of exactly one-millionth of a square inch. You can actually see the piece with your naked eye. But you cannot pick out a single opening in the sieve with the naked eye and concentrate on it. There are 160,000 square openings per square inch in this remarkable 400 mesh sieve by the way—54,375 more openings per square inch than in the 325 mesh sieve. The area of each opening is 0.0000028 square inch.

—Courtesy of W. F. Schaphorst

A Valuable Nut-And-Screw Kink

An ordinary nut and screw, as indicated in this sketch, can be used in many useful ways—as a jack—as a shim—as a clamp—etc. The sketch shows how easy it is to make a sure-fire holding device



for holding a bolt where wanted in a slot. The ordinary nut and screw, arranged as shown, will keep the bolt from sliding out even if the slot is vertical. If the slot is horizontal and it is desired to lock the bolt so that it will not slide in either direction, place a holding device like this on both sides. By turning the screw in the nut with a screw driver the nut is pressed up against the lower surface of the slot, as shown, and is held there rigidly. You can make one of these devices in a jiffy with a hacksaw out of scrap material.

—Courtesy of W. F. Schaphorst

What's the Right Torque for Bolts?

This is a tough question. Too many variable conditions. But the following may help.

★ ★ ★

The bolt takes two stresses during wrenching: (1) Torsion, (2) Tension. Tension is what you want. Torsion is the necessary evil due to friction. Probably 90% of applied torque goes to overcome friction.

★ ★ ★

With the friction factor changed by lubrication, plating, etc., the torque needed to produce a given tension is hard to predict. However, a useful empirical formula exists for **normal** friction conditions:

Inch-lbs. Torque =
0.2 x bolt diameter x bolt tension

★ ★ ★

Many tests show that the 0.2 torque coefficient is approximately constant for the usual friction conditions, for all diameters, and for both coarse and fine thread. Average deviation is about 7%. But when are conditions **"normal"?** The only **sure** way to check torque is to set up a pilot assembly and try it out.

★ ★ ★

In pilot testing for rigid joints, tighten a few bolts with torque wrench to failure, and then set torque at 75% of that load; or even at yield strength, since torsion component vanishes leaving bolt under tension only, which is well below ultimate strength.

—Courtesy of Russell, Burdsall and Ward Bolt and Nut Co.

Wire on Glass Stores Facts

Development of a new component that promises to increase the speed of electronic computers 10 to 20 times has been announced by National Cash Register Company.

★ ★ ★

The component, a glass rod with an electrochemically applied magnetic coating, is about 15 thousandths of an inch in diameter.

★ ★ ★

Small windings of wire around the rod store the information. It is capable of switching at a speed of one 250-millionth of a second, the time required for a beam of light to travel four feet.

New Booklet on Carbon Black Dispersion

A new 40-page booklet, titled "The Dispersion of Carbon Black in Rubber and its Role in Vulcanizate Properties", is available gratis from the **Instruments Division, Philips Electronics, Inc.,** 750 South Fulton Ave., Mount Vernon, N. Y.

★ ★ ★

The text discusses studies made with the electron microscope and contact microradiograph by **C. W. Sweitzer, W. M. Hess** and **J. M. Callan** of Columbian Carbon Combon Company Research Laboratories.

★ ★ ★

Subjects covered in Part 1 include: State of Dispersion Evaluation, Dispersion Evaluation Methods, Evaluation of Dispersion in Depth, Dispersion Standards by Photographic Method, Factors Controlling Dispersion, Particle size of Carbon Black, and Polymer.

★ ★ ★

Part 2 treats these subjects: Role of Dispersion in Vulcanizate Properties, Particle Size and Masterbatch Loading of Carbon Black, 75 Parts Carbon Masterbatch Loading, Oil Dosage, Banbury Mixing Procedure, Remilling, Masterbatch Temperature, Wet Masterbatching (Black Rubber), Dry Premixing Prior to Masterbatching, Discussion of Results, Summary and Conclusions, and Bibliography.

Welding Wire Comparison Chart

A comprehensive and extremely useful 4-page folder, Bulletin DH-1218-O, has been prepared and released by the **Page Steel and Wire Division, American Chain & Cable Company, Inc.,** Monessen, Pa. It replaces all previously issued ACCO bulletins on welding wire comparisons.

★ ★ ★

This new folder details the physical properties as welded, gives analyses, tensile strength, elongation and average Rockwell hardness numbers. In addition, it lists typical uses of gas welding rods, bare electrodes, automatic welding wire and metal spray wire. Comparisons between Page products and virtually all competitive makes are presented.

Mylar Production to Be Increased

Plans to increase manufacturing capacity for "Mylar" polyester film by 30 per cent were announced in December by the **Du Pont Company's** Film Department.

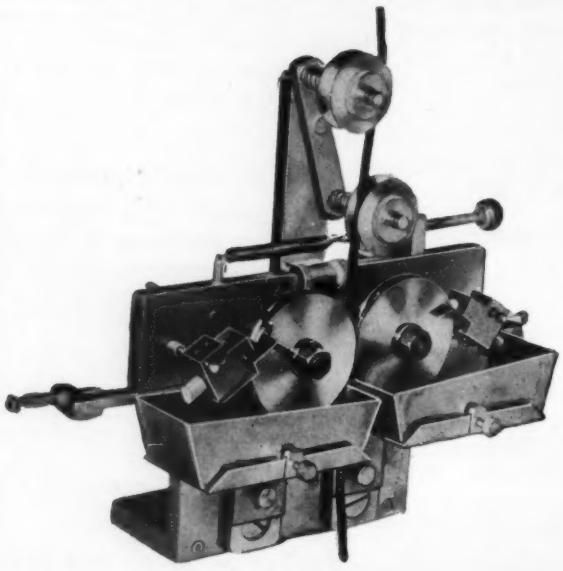
★ ★ ★

Construction to expand the company's Circleville, Ohio, plant will start shortly, and the new facilities are to be ready for operation early in 1960. This will be the second major expansion since commercial production of "Mylar" began in 1954.

★ ★ ★

Strongest of the plastic films, "Mylar" has excellent electrical insulating properties, is resistant to attack by most chemicals, and retains its properties under extremes

MARKING WHEELS and MACHINES for ELECTRIC WIRE



Gillies Engraved Concave and flat marking wheels are widely used printing the I.P.C.E.A. color code, numerical, semi-spiral striped, dating, or manufacturer's identification, etc. on insulated wire, tubing or hose.

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of heat and cold. It has found wide acceptance uses as electrical insulation, packaging, magnetic tapes, yarns, etc.

Aluminum Magnet Wire Specifications

Aluminum magnet wire in a broad range of sizes, shapes, and insulations is now being made available by **Kaiser Aluminum & Chemical Sales, Inc.**

★ ★ ★

Natural economies are brought about by the use of aluminum in producing magnet wire. Round, film insulated types show a 15% savings over the equivalent conducting length of copper wire in the most common sizes. Square, film and fibrous insulated types show 15-25% savings, depending on the insulation used. A typical film or paper insulated rectangular wire yields a 35% saving over its equivalent conducting length in copper.

★ ★ ★

The insulation on Kaiser Aluminum magnet wire is applied by the Wire and Cable Division of **The Electric Auto-Lite Company,** with plant locations at Port Huron, Mich., and Hazelton, Pa. The bare aluminum wire is manufactured at Kaiser Aluminum's Newark, Ohio, plant.

★ ★ ★

The new Kaiser Aluminum magnet wires are reported to have improved winding characteristics, and substantially better performance at high temperatures than their equivalents in copper. Both film and fibrous insulations are offered in operating temperature classes A, B, F and H. Special aluminum processing used in Kaiser Aluminum magnet wire permits the guarantee of higher conductivities (62.7% IACS) than ever before offered.

★ ★ ★

Price sheets and specifications on Kaiser Aluminum magnet wire are available through branch offices or headquarters at 919 N. Michigan Ave., Chicago 11, Ill.

For Fungus Resistance, Specify

TEXTILENE TWI-TAR

Offering great durability along with light weight, Textilene Twi-Tar is successfully used for buried communication cable (bedding and overall serving), expanded ACSR cable (expander between core and conductors), stationary power cable and portable cables.

Twitchell's superior Textilene line also includes: Moisture-resistant fillers — *Twi-Flex* and *Twi-Wax*. Used for non-metallic sheathed cable, maritime shipboard cable, varnished cambric cable.

Soft, dry fillers — *Twi-Port* and *Glascor** (Fiberglas-centered for high tensile strength without added bulk). Used for control, power, appliance, coaxial and communications cables, and all types of portable and flexible cords.

*Patent Applied For

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Twitchell's TEXTILENE Fillers Fill The Bill

Quality-controlled materials that are dependably uniform . . . in standard forms, or customized to special needs.

Initial low cost with savings added by production efficiency . . . flexible, ready-to-use fillers that fit all equipment, handle and form easily, always maintain desired shape.

Assured supply from a reliable domestic source . . . always available in economical and convenient packaging.

Proved performance as components of cables and wires that meet government specifications . . . stability shown by trouble-free installations in continuous service 20 years and longer.

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Teflon; vinyl; plastic; cambric; treated and untreated paper; glass; aluminum; brass and copper.

- Equipped with adjustable traverse, supply and windup stands, windup driving mechanism, and electric stop-motion. Capstan-release mechanism permits retracting conductor and replacing it for restarting operation after replenishing supply.
- Machine will apply tapes from ½" wide up to 1" wide on electrical conductors.
- "Reeves" variable speed unit provides for quick adjustment when change of lay is required.
- Production dependent upon width of material and angle of lay.
- Serving head speed dependent upon kind of material. Maximum speed 700 RPM.
- Driving pulley 8" diameter; 1¾" belt. Speed of pulley 330 RPM.
- Ratio serving head speed to pulley speed 2.12 to 1.
- Capstan 18" diameter, 3" face.
- Opening through serving head ⅜" diameter.
- Maximum diameter of flexible conductor ⅜".
- Supply packages 16" diameter, 1" maximum width, ½" minimum width. Size of hole in package 3".
- Supply tube holds eight reserve packages of 1" wide material.
- Maximum power requirement ¾ H.P.
- V-belt motor drive furnished upon request at additional cost.
- Reset counter for measuring product in feet furnished.
- Stands furnished to accommodate reels 30" or 36" in diameter with overall widths up to 16". Wider stands can be furnished upon request at additional cost.
- Special windup drive required for reels with drums under 12" diameter.
- Clamp lock holds windup reel arbor securely in lifter bearing.
- Machine mounted on base plate to assure proper alignment of frame and windup stand.
- Reels not furnished with machine.

Write for complete information

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New Connector for Coaxial Cable

A new concept in UHF connectors is announced by **Edlen, Inc.,** 8105 Woodmont Ave., Bethesda 14, Maryland. The Crimpee CR-8-UF, a solderless, low cost UHF connector for RG-8-U coaxial cable, meets all requirements of present UHF connectors, but overcomes all objectionable features. It is a 50 ohm connector, made to assure a 360° contact with cable braid and high mechanical strength. Assembly requires no special skill.

★ ★ ★

High quality materials are used throughout, with Teflon used for insulation. The connector is completely compatible with existing connectors.

★ ★ ★

For further details, write Edlen Inc., for Bulletin CR-8-EE.

Beldon Makes License Agreement

The Belden Manufacturing Company, holders of U.S. patents 278-2251 and 2814666 covering a construction of 300 OHM foam polyethylene transmission line, took legal action to prevent **Rego Manufacturing Company** from manufacturing and selling transmission line that Belden claimed infringed upon its patents.

★ ★ ★

In preliminary action in a federal court, a settlement was agreed upon resulting in the issuance of a consent decree. Rego will continue to manufacture foam polyethylene transmission line but under a license agreement with Belden.

Guide to Silicone Products

The 1959 Reference Guide to Dow Corning silicone products describes what silicones can best meet the needs of an unbelievable variety of problems ranging from adhesives to release agents, resins to rubbers, dielectrics to water repellents. It contains graphic examples showing where many Dow Corning silicone products are currently being used, and it gives in-

formation on how to get specific data on the Dow Corning silicone material best suited to any application.

★ ★ ★

This 16-page, illustrated guide features an expanded indexing system to facilitate quick and easy location of the more than 150 Dow Corning silicone products now commercially available.

★ ★ ★

For a copy, write **Dow Corning Corp.**, Midland, Michigan.

Meeting in Spain

The Instituto Del Hierro Y Del Accro (Iron and Steel Institute of Spain) has been requested by the International Committee of Foundry Technical Associations to organize the 26th International Foundry Congress. At the same time the Higher Council for Scientific Research will hold its 4th general meeting.

★ ★ ★

These meetings are scheduled for October 4-10, 1959, in Madrid. The programs cover technical papers and discussions, works visits, social functions, official receptions, technical conferences and special programs for ladies.

★ ★ ★

Those desiring to attend may secure information on the activities by writing the Institute at Villanueva 13, Madrid, Spain. Wagon Lits/Cook will act as official agents for travel and accommodation arrangements through any of its branch offices.

Manufacturer of Extrusion Nozzles Changes Name

The Bridgeport Jig Boring Co., manufacturers of extrusion tips and dies for electric wire and cable production, after many years of operation under this name, has formally had it changed to **Central Tool and Machine Company.** There has been no change in ownership or management.

★ ★ ★

The company, through its Wire Tool Division, began the manu-

Insure safe delivery of your cable with

NYECO
Steel
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Reels

100 TON SUBMARINE CABLE REEL
Designed and fabricated for the OKONITE CO., Passaic, N. J.

These leading mills are just a few of the many that use NYECO Steel Reels: OKONITE, ROEBLING, WESTERN ELECTRIC, GENERAL CABLE, ANACONDA, PHELPS DODGE.

MODERNIZE and enjoy greater protection against damage in shipping and processing with NYECO steel reels. Rugged, weather-resistant, splinter-proof, warp-proof... protects costly cable against damage due to dropping, bouncing, rough handling. Cost little more than wooden reels... last up to 10 times longer ...require minimum maintenance. Protect your investment and reputation by using NYECO steel reels.

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Send specifications for STEEL SHIPPING REELS, IMPREGNATING REELS, PROCESSING REELS, SUBMARINE CABLE REELS AND BRIDGE REELS. Prompt deliveries on large or small orders.

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Here's smoothness and luster you rarely get in tinned wire. Continental's special technique makes possible an enduring, uniformly bright finish . . . a wire so bright that it can replace plated wire on many products. It retains its brightness for long periods of time in normal use. Continental tinned wire meets your needs for quality and workability and is available in almost any temper and analysis in medium low carbon and low carbon steels.

FINE—16 gauge through 30 gauge, in 8" diameter coils
COARSE—20 gauge through 5/16", in 16" and 22" diameter coils.

For smooth beauty and high degree of perfection in wire, you will want to investigate Continental Tinned Wire. Write or Telephone—today; or return coupon below.

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

☐ Send Complete Details ☐ Have Salesman Call

CONTINENTAL STEEL
CORPORATION · KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

facture of tungsten carbide (extrusion tips for nozzles) six years ago. Because of its ability to produce these products in a quality and to an accuracy previously unavailable, has gained a widespread reputation for super-fine products. More recently the company has added a line of round, figure 8, serrated, tracer and other special shaped steel dies for 2 and 3 conductor wires.

★ ★ ★

Central's dies and tips are in use in leading wire and cable mills throughout the United States and in many foreign countries, these products being designed to fit all standard extrusion machines.

★ ★ ★

Since the company started the production of these highly specialized quality products, it has had to expand each year and now occupies a fine new building dedicated to the continued manufacture of products made to the highest degree of perfection as to materials and workmanship.

Screw Mfr. in New Plant

After nearly fifty years of manufacturing hex-socket screws and related products in downtown Hartford, Conn., **The Allen Manufacturing Company** is settled in its new plant, on a 32-acre site in Bloomfield, about seven miles from Hartford.

★ ★ ★

The size of the new plant has permitted considerable expansion of Allen's technical facilities. Room for both new equipment, new personnel, and the many research and development projects, have made it possible for the company to advance time schedules on many new products and improvements on present products.

★ ★ ★

Quality control, which Allen regards as one of the most important functions in the manufacture of its hex-socket screws and other products, now has adequate quarters and the engineering department has large, well lighted, air-conditioned rooms. More room in the

new plant has made possible the addition of new equipment in the metallurgical laboratories.

★ ★ ★

A new pilot plant will be one of the most valuable and productive areas for research and development in the entire plant. Under direction and supervision of the Chief Engineer, this special 10,000-square foot area is devoted to tests of new equipment, new processes and new materials.

★ ★ ★

Large areas in the new plant have been devoted to storage of raw materials, so that tens of thousands of tons of wire stock, as well as bar and rod stock, of all types and sizes, are on hand, ready for use in production of standard or special items. An unusual conveyor system, designed specially for Allen's new plant, and "Christmas-tree" racks provide storage for 4½ million pounds of bar and rod stock, keeping any wanted size or type instantly available.

G.E. Announces New Distributor Arrangements

New measures to aid in concentration on production of superior cemented carbide metal for dies were put into effect January 2 by the **Metallurgical Products Department of General Electric Company,** Detroit.

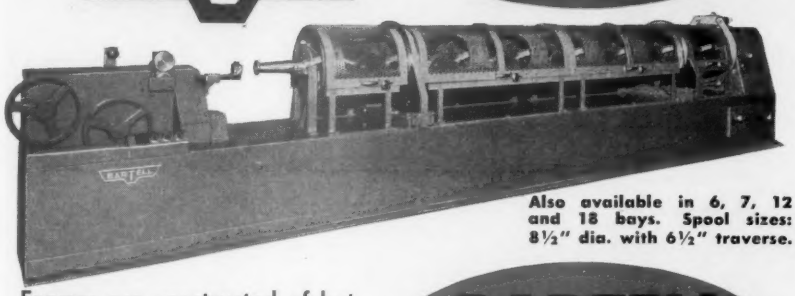
★ ★ ★

Kenneth R. Beardslee, general manager, said distribution of standard and special draw dies, heading and extrusion dies, will be through authorized Carboloy die distributors on a regional basis. The department will no longer manufacture fabricated dies. However, arrangements have been made to service die customers in areas where there are no die distributors at present.

★ ★ ★

Two of the new distributors, **Allied Carbide Products, Inc.,** formerly of Hatboro, Pa., now situated in Jamaica, Long Island, N. Y., and **Bronson & Bratton,** Chicago, formerly were agents for

BARTELL FOR THE BEST



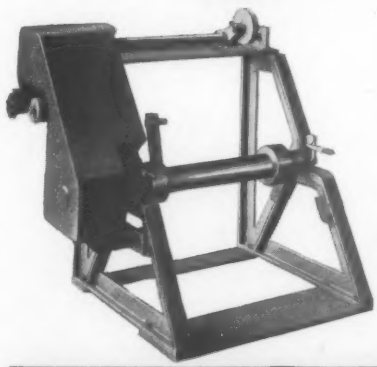
Also available in 6, 7, 12 and 18 bays. Spool sizes: 8½" dia. with 6½" traverse.

BARTELL SEVEN BAY HIGH SPEED STRANDER MODEL 7B-58-15

Frames are constructed of hot rolled shapes and plates to form a rigid box structure. Barrel is extruded 6062T-6 aluminum — Smooth starts through slip clutch driven by 7½ H.P. motor — Operators control station at front of machine — Main power control center at drive end — Electronically controlled automatic stop energizes solenoid operated brakes in event of wire breakage — Spool cradles and associated parts are completely interchangeable from one machine to another — Tungsten carbide wire guides throughout — Lay from ¼ in. to 5 in. long.

• CATERPILLAR CAPSTANS • SINGLE AND MULTIPLE HEAD RE-SPOOLERS • TAKE-UP & PAY-OFF STANDS FOR PLATING EQUIPMENT • WIRE STRANDERS

BARTELL TAKE-UP



This Take-Up is belt-driven, the drive originating from a slip clutch located outside the capstan box. Electrically operated traverse adjustable from zero to maximum reel width. Accommodates reels up to 30" dia. Speed selector sheave adjusts lay on reel to suit diameter of finished strand.

WE ALSO DESIGN AND BUILD SPECIAL EQUIPMENT TO MEET SPECIFIED REQUIREMENTS

BARTELL MACHINE-TOOL CORP.
YACHT CLUB ROAD ROME, N. Y.
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How to cut costs on

REELS...SPOOLS...BOBBINS

Here's the first step! Plan now to set up a handy file on Apco Mossberg Steel Reels, Spools and Bobbins. That way you'll always have a ready reference to one dependable source of supply . . . save yourself hours of time and trouble when looking later on.

Next, make it a point to get all the facts you need to specify the right reels, spools or bobbins to meet your individual requirements. Given the opportunity, Apco Mossberg Engineers can custom design units to meet your exact specifications in size, shape, balance and trueness . . . many times at a substantial saving over the units you are now using.

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World Trade Center
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Canadian Representative:
Hugh P. Williams & Co.
47 Colburne Street, West
Toronto, Ontario, Canada

APCO MOSSBERG COMPANY
Lamb Street, Attleboro, Mass.

the General Electric unit. A new company is **Glen Carbide, Inc.,** Pittsburgh.

★ ★ ★

Mr. Beardslee said the regional appointments will give customers in the major wire drawing sections of the nation faster and more complete service because standard case dies will be carried in stock and the distributors will fabricate special dies. Elimination of fabricated dies from the manufacturing program of the Metallurgical Products Department, Beardslee said, will permit further concentration of personnel and equipment on development of Carboloy cemented carbides for the wire industry.

★ ★ ★

These moves are part of the department's continuing program to supply industry with new improved carbides for greater economy in the manufacturing area.

★ ★ ★

Earle A. Glen, currently manager of die sales, will leave the Metallurgical Products Department to establish **Glen Carbide, Inc.,** and be distributor in the Pittsburgh area. Mr. Glen also will take over the Pittsburgh die service shop previously owned by Metallurgical Products Department. **C. W. Martin** and **Douglas E. Hazlett,** die sales representatives with the department, will become members of the Glen firm in the same capacity.

★ ★ ★

One of the best known men in the field, Mr. Glen has authored many technical articles on drawing and blanking dies. He began his career with Cleveland Wire Works as a service engineer, later specializing in sales. He performed the same work after joining G-E in 1928 and in 1944 was named manager of die sales. He is a past chairman of the ferrous division and general chairman of the program committee of The Wire Association.

★ ★ ★

Mr. Martin was an instructor in the customer die school of the Metallurgical Products Department from 1951 to 1954. Since then he has been in the Pittsburgh area.

He also gained 12 years' experience as a wire mill foreman. Mr. Hazlett joined two years ago, selling to users and fabricators of cemented carbide dies.

★ ★ ★

W. K. Facknitz, a product planning specialist, will become die specialist in the Detroit headquarters to work with distributors and coordinate sales activities.

Folder on Scovill's New Trademark

For the past year or more a highly distinctive four-color trademark design has been used extensively by the Mills Division, Forging and Screw Machine Division and Waterville Division of **Scovill Manufacturing Company.** In an attractive and unusual folder Scovill tells the story of this trademark, why it was created, what the design signifies and how it is being used in many different ways in the Company's sales programs. This Scovill trademark meets all of the basic requirements of an effective and memorable design. It is simple. It is linked to the Company's products. It is distinctive. And it may be used in 4-colors, or even in black and white for almost every conceivable trademarking purpose. A limited number of copies of the folder are available to fill requests. Write to Scovill Manufacturing Co., Waterbury, Conn.

Signal Corps Holds Successful Wire and Cable Conference

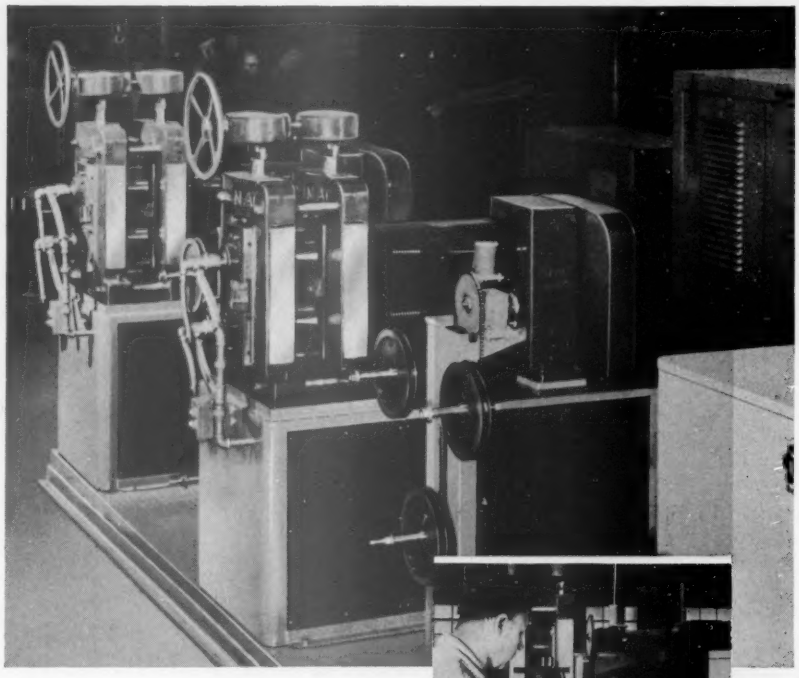
The Seventh Annual Symposium on Technical Progress in Communication Wires and Cables was held on December 2, 3 and 4, 1958, in Asbury Park, New Jersey, under the auspices of the **U. S. Army Signal Research and Development Laboratory,** Fort Monmouth, New Jersey.

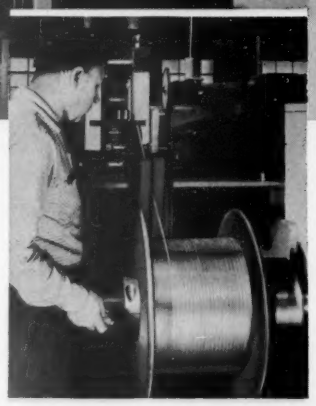
★ ★ ★

At the opening session, **Col. H. McD. Brown,** Commanding Officer of the Laboratory, welcomed the group to the Symposium, expressing his personal gratification for the excellent degree of cooperation afforded the Signal Corps by the wire and cable industry.

★ ★ ★

During the three-day session, a





HIGH PRODUCTION *Wire Flattening* **MILLS**

Now you can get extremely close tolerances combined with high speed production, with Stanat Wire Flattening Mills. These Stanat mills can be used to produce a wide variety of flat and shaped wire.

Designed to offer maximum flexibility of operation and arrangement, Stanat mills are available either as completely self-contained package units or as individual components for erection at your plant.

Stanat wire mills are available in 4", 6", 8" and 10" roll diameters, with optional equipment to fit your individual production requirements.

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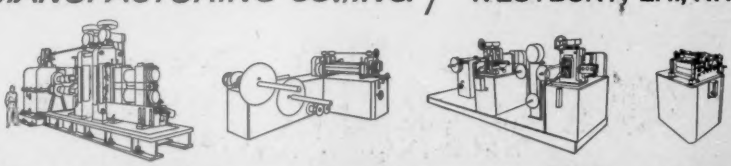

MFR'S OF ROLLING MILLS, GANG SLITTERS, WIRE FLATTENING MILLS, ROLLER LEVELERS AND BULL BLOCKS

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FIBER GLASS SPOOLS
never need maintenance
You'll never find light-weight molded fiberglass Toteline spools in your repair shops because they never need maintenance. They don't splinter, crack, dent or bend out of shape.
LOWEST NET COST
Toteline spools last a lifetime—making the cost per spool-year only a few pennies. They are lightweight, too—reducing handling expenses.
PRECISE WINDS EVERY TIME
The smooth, splinter-free surface of Toteline bobbins eliminates tangles or breaks. Wire coating remains undamaged and stays color-fast.
It will pay you to investigate using Toteline fiberglass reels in your operation. The savings in dollars and efficiency will surprise you. Why not write for more information now.
TOTELINE
MOLDED FIBER GLASS TRAY CO., Linesville, Pa.
World's largest producers of reinforced plastic trays and toteboxes

total of 22 technical papers were presented, copies of which were made available to each person in attendance upon registering. Following each paper, there was an opportunity for questions and answers, of which many persons took advantage.

★ ★ ★

At 5:30 on Tuesday, December 3rd, a hospitality hour was held, which was sponsored by 176 firms who were represented there, and on Wednesday evening, December 4th, the annual banquet, complete with a fine floor show, was featured. At that time, it was announced that **Howard L. Kitts,** who has served for five years as Chairman of the Symposium Committee, would no longer be able to function in this capacity, as he had been given a new assignment at the Laboratory. **Howard F. X. Kingsley,** Co-Chairman, was named as Chairman of the 1959 meeting.

★ ★ ★

The committee responsible for the 1958 symposium was comprised of:

Howard L. Kitts, Chairman
Chief Outside Branch Plant,
USA SRDL
Fort Monmouth, N. J.

Howard F. X. Kingsley, Co-Chairman
Communications Dept., USA SRDL
Fort Monmouth, N. J.

R. Blain, USA EA
Arlington, Va.

C. T. Wyman
Bell Telephone Laboratories, Inc.
Kearny, N. J.

Martin G. Caine
Monsanto Chemical Co.
Springfield, Mass.

A. L. McKean
Phelps Dodge Copper Products Corp.
Yonkers, N. Y.

J. L. Robb
Superior Cable Corp.
Hickory, N. C.

B. Levinson
The Okonite Co.
Paterson, N. J.

★ ★ ★

Well over 800 persons registered for the 1958 symposium, approximately 100 more than last year. The general feeling was that the meeting was successful from every point of view—quality of papers, attendance, and extra-curricular activities. The new committee, two members of which change each year, is looking forward to a similarly satisfactory meeting in the coming December.

Outstanding Personalities of the Wire Industry

To Represent Manufacturers in the East

Establishment of a new organization, the **F. L. McAuliffe Company,** was announced in December by **Frank L. McAuliffe,** who has recently terminated 35 years of service with the **General Electric Company.** Mr. McAuliffe will act as Sales Consultant to **Colbourne Machine Co., Essex Wire Corporation** and **The P. D. George Co.** He will serve as Manufacturer's Representative for **A. C. Horn Companies, Adams Brush Manufacturing Co. Inc.,** and the **J. H. Young Co.** in the Upper New York State and Central New England area.

★ ★ ★

Frank McAuliffe, whose service with General Electric was mainly in its wire and cable and insulating materials businesses, will maintain his company's headquarters at

Frank L. McAuliffe

2315 Plum Street, Schenectady 9, New York.

Riverside-Alloy Appoints Sales Specialist

Walter R. Keith has been appointed to the Riverside-Alloy sales force, as announced by F. H. Conant, General Sales Manager of **Riverside-Alloy Metal Division, H. K. Porter Company, Inc.**

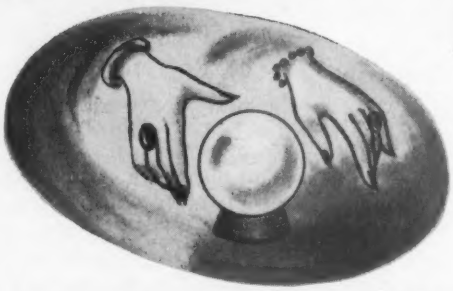
★ ★ ★

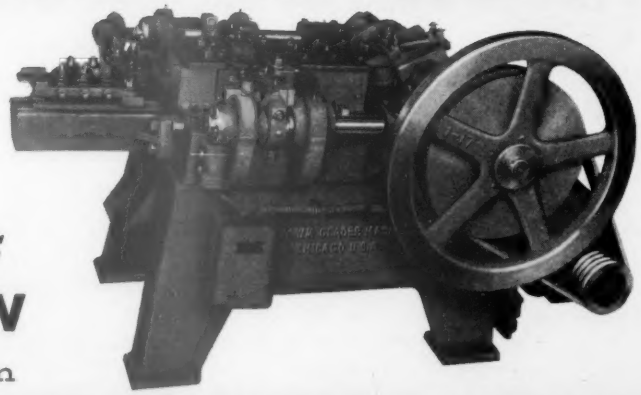
He will specialize in products produced by the company's Prentiss Wire Mills, Holyoke, Mass., a leading producer of specialty wire for bookbinding, box stitching, weaving and many other uses. His headquarters will be at the Division's New York district office, from where he will sell in the New York, New Jersey, eastern Pennsylvania, Delaware and Maryland areas.

Chase Announces Executive Appointments

Walter L. Smith, vice president-operations and a veteran of 43 years service to **Chase Brass & Copper Co.,** has been appointed Assistant to the President by **Glenn P. Bakken,** president of Chase. Succeeding him will be **Gilbert R.**

IF THERE'S A NAIL MACHINE IN YOUR Future make it a GLADER





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Boutin, of Torrington, works manager of Chase Metal Works, Waterbury. Both appointments were effective Dec. 1, 1958.

★ ★ ★

Mr. Smith joined Chase in 1915, as a clerk in the Metal Works. He advanced rapidly through several key positions until, in 1928, he was promoted to superintendent of the tube mill. In 1930 he was selected as superintendent of the Chase brass mill in Cleveland, advancing to Works Manager in 1936. Recalled to Waterbury in 1946 to be works manager at the Metal Works, he held this position until he was elected vice president-operations, and a member of the board of directors.

★ ★ ★

Mr. Boutin came to Chase in Feb. 1950, as plant controller at the Metal Works, advancing to Works Manager in June, 1957.

Holden Appoints District Manager

Theodore B. Wilk, sales representative for **The A. F. Holden Co.,** has been appointed district manager of the Detroit firm's industrial sales organization in northern Ohio and western Pennsylvania.

A graduate metallurgist of Purdue University, his career has been devoted to engineering sales and service in the field of heat treating and metalworking. He joined Holden early in 1957.

Basil Elevated by Rockbestos

Alexander S. Basil has been made Vice President in Charge of Manufacturing for **Rockbestos Products Corporation,** it was announced by **Albert S. Redway,** president. This appointment was made by the Board of Directors at its December meeting.

★ ★ ★

Mr. Basil moves up from the position of Works Manager which he has held since he joined Rockbestos in July, 1957, following more than thirty years with the United States Rubber Company.

★ ★ ★

Except for one year with Kaiser Aluminum and Chemical Company, his entire career before joining Rockbestos was with U. S. Rubber. He was graduated as an engineer from Rensselaer Polytechnic Institute, and took graduate work at Brown University.

English Firm Appoints Canadian Representative

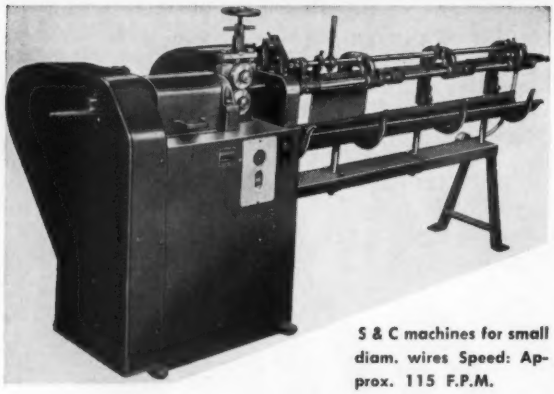
General Engineering Co. (Radcliffe) Ltd., Radcliffe, England, has announced the appointment of **Dominion Electrohme Industries Ltd.,** Kitchener, Ontario, to represent the company in Canada. This will make possible more speedy handling of inquiries and better technical service to customers.

★ ★ ★

Dominion Electrohme has had large experience in the electrical engineering industry and is well-equipped to render technical counsel on General Engineering's wire machinery, besides carrying stocks of spare parts for immediate service.

★ ★ ★

New! Improved! Fast!
WELLS STRAIGHTENER & CUTTER



S & C machines for small diam. wires Speed: Approx. 115 F.P.M.

This completely redesigned line combines maximum efficiency with that rugged dependability, for which WELLS S&C machines have become justly famous.

Built in several sizes to handle 2 to 18 ga. basic and high carbon wire.

FEATURES

The guide bar of these new machines can be supplied for any cut lengths • The rotary flier runs on ball bearings for smoothness and long life • Cut-off is actuated by a solenoid for extreme accuracy of cut lengths • A two point cam construction provides a quick and positive return of the cut-off knife, eliminating the need for a clutch and dog • A counter is standard equipment.

A COMPLETE RANGE OF S & C MACHINES
IS MADE BY WELLS FOR ALL SIZES OF WIRE.
SEND FOR CATALOG ON THE COMPLETE LINE.

Frank L. Wells Company

Builders of Fine Wire Working Machinery

5821 FIFTH AVENUE • KENOSHA, WISCONSIN

H. J. R. Court, B.A.Sc., Sales Manager of the Technical Products Div. of the Canadian firm, will be responsible for the sale and servicing of General Engineering's equipment. He has had 10 years of experience with the Royal Canadian Air Force on heavy ground radar and later served as Project Engineer for the Canadian General Electric Co. Ltd. and as Applications Engineer and Sales Manager with Varian Associates of Canada.

★ ★ ★

The English firm makes extruders, capstans, take-ups and other equipment for the electric wire and cable industry.

Chief Chemist Appointed at Apex Alkali

Apex Alkali Products Company of Philadelphia has announced the appointment of **George W. Finley, Jr.,** as Chief Chemist. George was

George W. Finley

born in Philadelphia March 31, 1919, and is a graduate of Episcopal Academy. He attended the University of Pennsylvania from 1937 to 1940 and obtained his BS degree in Chemistry from Villanova College in 1942. Before coming to Apex, he was associated with the International Chemical Company of Philadelphia from 1937, where he was engaged in research and development pertaining to industrial lubricants and cleaning compounds. His appointment to the staff at Apex is in keeping with the Company's forward-looking policy in research and development for the metal working trades.

Chase Elects Preston Executive Vice President

Election of **William H. Preston,** to the position of Executive Vice President of **Chase Brass & Copper Co.,** a subsidiary of **Kennecott Copper Corporation,** has been announced by President **Glenn P. Bakken.** Mr. Preston assumed his new duties on Jan. 1, 1959, a position which has been vacant since Mr. Bakken was elected president of Chase on Feb. 20, 1957.

★ ★ ★

Mr. Preston comes to Chase from **Joy Manufacturing Company,** Pittsburgh, Pa., manufacturers of mining and construction equipment, where he has held several key executive positions in both general manufacturing and sales. He was Works Manager of Joy's Claremont Works, in Claremont, N. H., before his promotion to Sales Manager of their mining and construction division.

★ ★ ★

Born in Brooklyn, N. Y., Mr. Preston is a graduate of Poly-

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NEW DEPARTURE BALL BEARING No 88007 INSERTED IN NYLON
the NEW material that withstands hi-speed pressure of wire by the tons
PULLEYS ARE AVAILABLE IN VARIOUS SIZES AND WITH BEARINGS OR BUSHINGS AS SPECIFIED
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NEW HAVEN 3, CONNECTICUT

technic Institute of Brooklyn, where he received his degree in Mechanical Engineering, cum laude, in 1942. He also attended Wharton Graduate School, of the University of Pennsylvania, where he studied accounting and industrial relations.

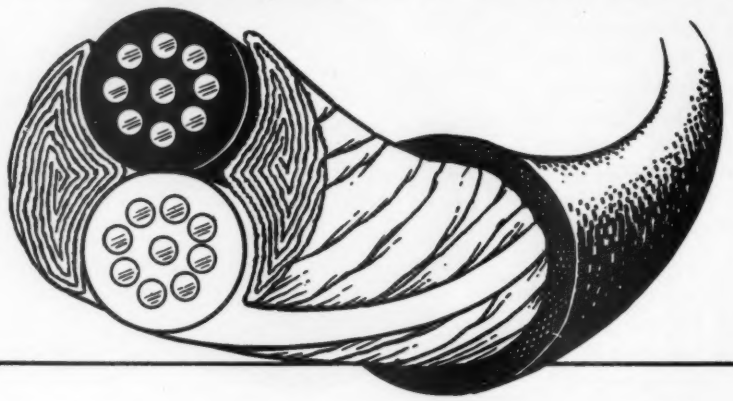
Resigns as ACCO Chairman

Wilmot F. Wheeler, Sr., active for more than 42 years of continuous service with the **American Chain & Cable Company, Inc.,** has resigned as Chairman of the Board and as Chairman of the Executive Committee according to an announcement by **Cyrus N. Johns,** president and chief executive officer. He will, however, continue as a director and as a member of the Executive Committee of the Corporation. The resignation became effective on December 31, 1958.

★ ★ ★

He began his career with ACCO on October 1, 1916, and was elected a director on July 15, 1919; Treasurer on November 23, 1920; Executive Vice President on May 19, 1936; President on February 15, 1946, and Chairman of the Board on May 1, 1951.

INSIDE STORY ON FLEXIBLE CORDS



If you are not realizing a desired profit in your manufacture of flexible cords, why not consider Plymouth S.J. (Sisal) Filler for these reasons:

STRENGTH: Provides ample tensile strength to meet U.L. tests for 18-16-14 gauge, S, SJ, SV, SJT, SVT cords. Comes in 4 sizes.

FLEXIBILITY: S.J. Cable Filler will not stiffen cord in *any* way.

GREATER FILL CAPACITY: Plymouth's special S-Z twist (opposing twists) makes finished cord uniformly round, with no ridges, bumps or convolutions.

CLEAN STRIPPING: S. J. Cable Filler allows cleaner, faster cutting of finished product in Cord Set department . . . no ragged filler ends.

ECONOMY: The end result of all these advantages. Plymouth S.J. Cable Filler has been proven by several of the largest flexible cord manufacturers to be the most economical filler ever used.

Call or write any office below. We will be glad to consult with you on your cable filler problems.

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Boston, Mass.
CApital 7-1134

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HArrison 7-6238

366 Madison Ave.
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YUkon 6-9230

P.O. Box 10215
New Orleans, La.
VErnon 5-7243

70 Sacramento St.
San Francisco, Calif.
GArfield 1-4709

750 Bay St.
Toronto, Ont., Canada
EMpire 3-4281

PLYMKRAFT DIVISION
Plymouth Cordage Company, Plymouth, Massachusetts

At the same time it was announced that **Wilmot F. Wheeler, Jr.,** formerly Vice President, had been elected Executive Vice President and a director of the corporation.

To Manage Distributor Sales for Norton

Wilfred R. Ogg, Chicago district manager of **Norton Company's Grinding Machine Division** since 1951, became manager of distributor of sales for the Division January 1, 1959. In this newly-created position, he will supervise the activities of machinery distributors who report directly to the Worcester, Mass. main office of the company. He will also have charge of all export sales of the Division made through **Norton Behr-Manning Overseas Inc.**

★ ★ ★

Calvin K. Kirk succeeds Mr. Ogg as Chicago district manager and **Thomas D. Bushman** has succeeded Mr. Kirk as product research engineer.

Sheet and Tube Elects Four New Vice Presidents

The Board of Directors of **The Youngstown Sheet and Tube Company** has elected four new vice presidents. They are:

Robert P. Bremner, 14 Oak Drive—vice president, raw materials.

Donald S. Day, 128 Alburn Drive—vice president, traffic.

Dr. Karl L. Fetters, 2 Oak Drive—vice president, research and development.

James D. Sloan, 216 Edna Street—vice president, purchasing

★ ★ ★

All four assumed their new posts January 1.

Kaiser Aluminum Appointments

Samuel P. Whiteside has been appointed northeastern regional sales manager for **Kaiser Aluminum & Chemical Sales, Inc.,** succeeding **R. E. Belknap,** who has been moved to the newly established position of eastern division manager of trade relations. Both are headquartered at the company's New York offices at 300 Park Ave.

Mr. Whiteside has been with Kaiser Aluminum since 1952. He was formerly assistant to the general sales manager at the company's general sales offices in Chicago. Mr. Belknap joined the company in 1949 and has served successively as Boston branch manager, New York district manager and most recently as northeastern regional manager.

Press Release

Warren Wire Company has announced the appointment of **R. A. Rahe** as General Manager of the Western Division of the Company, whose manufacturing mill is located at Alhambra, California.

★ ★ ★

Mr. Rahe, a graduate of Western Reserve, has been an employee of the Warren Wire Company for more than eight years. He was formerly Manager of Product Development with offices at the home office in Pownal, Vermont. The Company also announced the installation of additional machinery at the Alhambra plant to increase its production of high temperature cables and magnet wire.

Represents Twitchell on West Coast

Edward W. Humphreys has been appointed West Coast representative for the 'Textilene' line of electrical wire and cable fillers manufactured by **E. W. Twitchell,** Inc., Philadelphia, a leading processor for over 35 years of fibre fabrics and of twisted, woven, braided and other forms of paper.

★ ★ ★

Mr. Humphreys joined the Twitchell organization after majoring in chemical and mechanical engineering at Drexel Institute of Technology, and was assigned to the company's research laboratories. The association was interrupted by his military service with the U. S. Air Force. Returning to the firm after his discharge, he was made a member of the sales department, handling the cable filler line on the East Coast.

★ ★ ★

Types of 'Textilene' fillers that he will handle include 'Twi-Flex' and 'Twi-Wax' for moisture resistance. 'Twi-Tar' for fungus resistance, and Fibreglas-centered 'Glascor' for high tensile strength without added bulk. End uses include control, power, appliance, communications, coaxial, maritime shipboard, and non-metallic sheathed cables.

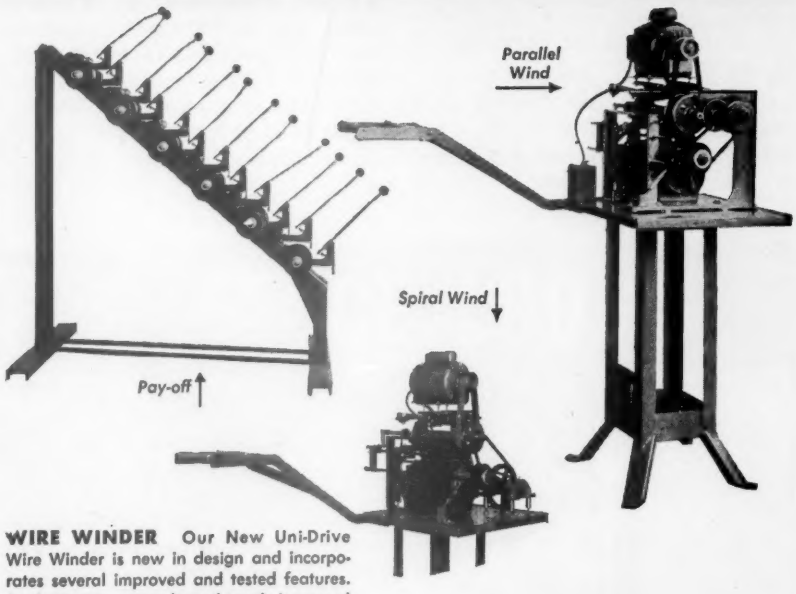
Crucible Steel Appoints Sales Manager

William R. Mogg has been appointed sales manager at the **Crucible Steel Company's** Spring Division. He was formerly sales manager of special products at the Cleveland Graphite Bronze Co., where he had been employed since 1940 in various sales, engineering and production capacities. Prior to that he served as sales engineer for the Ohio Brass Company. Mr. Mogg holds a Bachelor of Science degree in metallurgical engineering from the Case Institute of Technology in 1936.

Joins Wilbur B. Driver

Peter Stefan has been appointed manager, mechanical alloys, for **Wilbur B. Driver Co.,** Newark, N. J. Prior to joining this company, he

STANDARD UNI-DRIVE WIRE WINDER



WIRE WINDER Our New Uni-Drive Wire Winder is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel — no over or under-winding. Can also be furnished with a slight spiral pattern for winding exceedingly fine wire. Automatic Stop Motion controls each strand. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors.

Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAY-OFF Our Pay-off Attachment consists of a heavy fabricated frame on which Pay-off spools are mounted to cover desired number of ends to be wound. Equipped with spindles, running on self-aligning ball bearings, with size of spindles and adapters to accommodate customers' pay-off spool. Compensating Attachment to control the tension of each individual strand of wire, applying the same tension when spool is full as when empty. Can also be adapted for use with bunching machines.

STANDARD MILL SUPPLY COMPANY
31 ESTEN AVENUE PAWTUCKET, R. I., U. S. A.

held various managerial positions in the Alloy Metal Wire Div. and Riverside-Alloy Metal Div. of H. K. Porter Co.

★ ★ ★

Mr. Stefan will serve as a member of the Ferrous Program Committee for the 1959 Annual Convention of The Wire Association.

Benton Promoted by Anaconda

The appointment of **William H. Benton, Jr.,** to the position of general manager of mills of the **Anaconda Wire & Cable Company** was announced in December by **W. E. Sprackling,** President.

★ ★ ★

Mr. Benton was mill manager of the company's Marion, Ind., mill from 1951 until 1957 when he was made assistant vice president-manufacturing, with headquarters in Hastings.

★ ★ ★

Anaconda Wire & Cable Company is a 70%-owned subsidiary of the Anaconda Company.

American Metal Appointment

The appointment of **I. K MacGregor** as Vice President—Staff Operations of **American Metal Climax, Inc.,** has been announced by **Walter Hochschild,** Vice Chairman. Mr. MacGregor formerly served as Vice President—Eastern Operations of the corporation's Climax Molybdenum Company Division.

Kaiser Sales Appointments

Two management appointments and expansion of warehousing facilities in the Western region have been announced by **J. Carl Ferguson,** general sales manager of the Electrical Conductor Division, **Kaiser Aluminum & Chemical Sales, Inc. L. M. Guibara** becomes insulated products manager of the Western region, and R. R. Piantanida has been named Western electrical conductor regional manager. Both men are located at Oakland, California.

★ ★ ★

In addition, a large warehouse for Kaiser Aluminum insulated electrical conductor products has been established at Los Angeles. The division also operates West Coast warehouses at Oakland and Tacoma, Washington.

★ ★ ★

The appointments and new warehousing facilities are the initial steps in a program to keep pace with steadily increasing sales of aluminum conductor in the eleven Western states. Presently, this area represents 24 percent of the nation's total market for electrical conductor products.

★ ★ ★

In his new position, Mr. Guibara will concentrate on the promotion and sale of insulated aluminum conductor in the West, and will coordinate the technical assistance made available to customers there. He joined Kaiser Aluminum in

1957 as Western regional manager.

Nathaniel Cole Harrison

Nathaniel C. Harrison Sr., a member of the board of directors and retired vice president of the Atlantic Steel Co., died on December 13, 1958, at his home, 262 The Prado, NE. He was 73.

* * *

Mr. Harrison had been prominent in the steel industry for many years. He had been associated with the Atlantic Steel Co. for 33 years before his retirement in 1948.

* * *

A native of Petersburg, Va. Mr. Harrison was a graduate of Lehigh University. He was alumni treasurer of the Georgia Tech chapter of Beta Theta Pi fraternity.

* * *

He joined Atlantic Steel in 1915 as Chief Engineer, became General Superintendent in 1916 and in 1921 was elected Vice President. He was made a director in 1933.

Hugo Scheid

Hugo Scheid, President of the **Mercer-Robinson Engineering Company,** 395 Allwood Ave., Clifton, N. J., died suddenly of a heart attack on December 18, 1958.

* * *

The business will be carried on without change by the existing organization with **Sidney R. Dresser,** General Manager of the Robinson Division, in charge of the engineering and manufacture of equipment for the wire and cable industry.

Verne E. Minich

Verne E. Minich, founder of **Wheelabrator Corp.,** Mishawaka, Ind., died on December 13 at the age of ninety-one.

* * *

He became interested in the blast cleaning business in 1908, when he acquired a machinery concern and, through a series of later consolidations, built up a company that, when the airless blast cleaning machine was developed, was called the American Wheelabrator and Equipment Corp. This, in 1955, was shortened to the present name.

New President for Ansonia

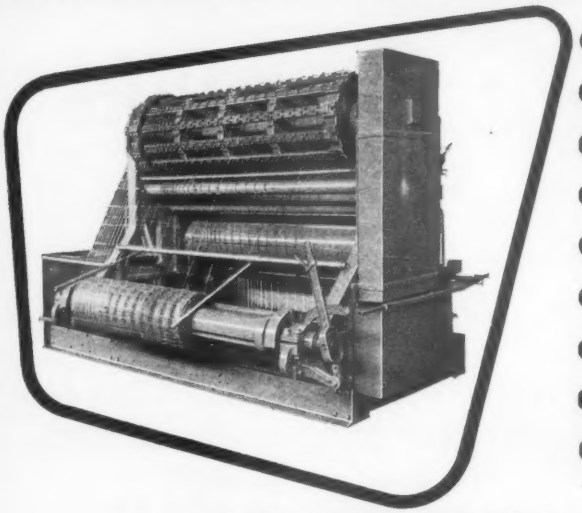
Following a directors meeting on December 16th, it was announced that **Frederick Kenner** had been elected President of **The Ansonia Wire & Cable Company,** Ashton, Rhode Island, succeeding **J. S. Chafee.** Mr. Kenner took office December 22nd.

* * *

Mr. Kenner is a graduate of The University of Rhode Island, Class of 1937, where he majored in chemistry. During his business career, he has been closely associated with the wire and cable industry. In 1937 he founded **The R. I. Insulated Wire Company** and became its president. Following duty as a naval officer in World War II with the Office of Naval Inspection at Detroit, Mich. and Toledo, Ohio, Mr. Kenner returned

(*Please turn to page* 250)

Interlocking FENCE LOOMS



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Specialists In Fence Looms

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.
Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50c for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,862,602, WIRE BELT, patented December 2, 1958 by Don S. Greer, Winchester, and John H. Lowe, Waltham, Mass., assignors to Wire Belt Company of America, Incorporated, Cambridge, Mass., a corporation of Maryland.

The wire belt, which is described as inherently more flexible than belts of the same general character, is particularly adapted to convey relatively small articles, as chocolate-coated confections, fried foods and cookies, in an arcuate path.

★ ★ ★

No. 2,862,630, STACKER MECHANISM FOR COIL SPRINGS, patented December 2, 1958 by Martin J. Nelson and Edward Turecki, Chicago, Ill., assignors to Wunderlich Spring Machinery Company, a corporation of Illinois.

This stacker is described as an improvement upon the one described in U. S. Patent No. 2,718,314. The present stacker is said to accurately nest the springs in uniform stacks and is adapted to handle springs of various sizes.

★ ★ ★

No. 2,862,670, AUTOMATIC WIRING APPARATUS, patented December 2, 1958 by Rudolph F. Mallina, Hastings on Hudson, N. Y., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

The apparatus is adapted for simultaneously applying and securing the opposite ends of a length of wire to spaced terminals on a panel temporarily supported by the apparatus.

★ ★ ★

No. 2,862,671, AUTOMATIC WIRING SYSTEM AND APPARATUS, patented December 2, 1958 by Thomas L. Dimond, Rutherford, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

More specifically the apparatus is provided for making wire electrical connections between selected terminals of an array of panel-mounted terminals, employing controls including a record of commands for wiring connection operations to be performed.

No. 2,863,170, EXTRUSION HEAD, patented December 9, 1958 by Philip W. Foss, Melrose, Mass., assignor to The Rex Corporation, West Action, Mass., a corporation of Massachusetts.

This head is arranged to extrude a plastic coating upon a wire while within the head.

★ ★ ★

No. 2,863,171, APPARATUS FOR COATING STRANDED CONDUCTORS FOR ELECTRIC CABLES, patented December 9, 1958 by Edward Peter von Bergen, London, England, assignor to International Standard Electric Corporation, New York, N. Y., a corporation of Delaware.

Apparatus is disclosed for manufacturing a multi-strand electric cable consisting of a number of conductors provided in the interstices therebetween with a barrier of insulating material and comprises a closing die formed with a tapered bore, an extrusion barrel and a passage extending through the wall of the die intermediate the ends of the tapered bore and connecting the bore with the extrusion barrel.

★ ★ ★

No. 2,863,279, WIRE ROPE, patented December 9, 1958 by Gerhard Fritz Dietz, Monchroden, Coburg, Germany.

The rope comprises at least one layer of strands being alternately laid in cross

NOW...WITHIN 48 HOURS

- RUGGED
- ONE PIECE
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lay and Lang's lay, each strand including an even number of wires half of which have a larger diameter than the other half and each two adjacent ones of the larger-diameter wires defining a circumferential recess with the small-diameter wire therebetween, and a larger diameter wire of one of said strands engaging a circumferential recess of an adjacent strand so as to interlock the strands.

★ ★ ★

No. 2,863,609, COIL WINDING MECHANISM, patented December 9, 1958 by William T. Link, Montreal, Quebec, Canada, assignor to Northern Electric Company, Limited, Montreal, Quebec, Canada, a corporation of Canada.

This mechanism is adapted for use with a ring type coil winding mechanism, the mechanism including a rotatable electrical conducting shuttle in which a predetermined number of turns of strand has been inserted, the shuttle being arranged to interlink a core and to superimpose the strand thereon to form a coil. The improvement comprises electronic means said to wind these coils in precise inductance without final adjustments, notwithstanding normal variations in the permeability of the core rings.

★ ★ ★

No. 2,863,613, STRAND REELING APPARATUS, patented December 9, 1958 by Tillman T. Bunch, near Ashland, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Winding is effected of a strand delivered at a constant predetermined linear speed upon a takeup reel including a winding surface having a peripheral speed somewhat greater than the linear speed of the strand.

★ ★ ★

No. 2,863,615, WIRE REELING APPARATUS, patented December 9, 1958 by Herbert Kenmore, Jersey City, and Walter J. Manson, West Orange, N. J., assignors, by mesne assignments, to National Standard Company, Niles, Mich., a corporation of Delaware.

The device of the invention is for association with apparatus which supports the wire in the form of a rotating helix with a horizontal axis along a horizontal support, and the device is a collecting means for collecting the wire as it reaches the end of the horizontal support.

★ ★ ★

No. 2,864,091, GLOVE WITH WIRE MESH REINFORCING, patented December 16, 1958 by Herbert Schneider, Corrollton, Ohio, assignor to Martins Ferry Glove Company, Uhrichsville, Ohio, a partnership of Ohio.

Woven all-metal wire mesh material is employed upon the front parts of the finger portions and the palm portions of the glove and bound to the pliable glove material.

★ ★ ★

No. 2,864,276, DEFORMABLE HEAD NAILS, patented December 16, 1958 by Edward M. Parker, South Gate, Calif.

A nail is disclosed for attaching a plastic core wall board having an easily damaged outer surface to a wooden frame member of a building, the head being sufficiently thin axially relative to the diameter of the shank to be deformed toward an essentially parallel relation with respect to the damageable surface before the shank would bend when the nail is driven at an angle which is not directly perpendicular to this surface.

★ ★ ★

No. 2,864,565, APPARATUS FOR DISPENSING WIRE, patented December 16, 1958, by Robert L. Whearley, Fort Wayne, Ind., assignor to Rea Magnet Wire Company, Incorporated, Fort Wayne, Ind., a corporation of Indiana.

More specifically the invention resides in a specially-formed damping ring for use in an annular wall spacing of a container in wire dispensing apparatus in which insulated wire coiled elliptically in the annular spacing of the container is dispensed axially of the container.

★ ★ ★

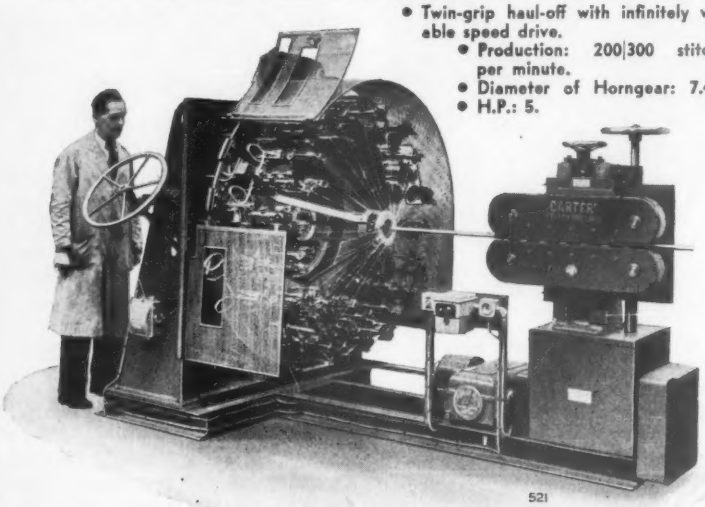
No. 2,864,728, COPPER CONDUCTOR COATED WITH SILICONE RESIN COMPOSITION, patented December 16, 1958 by Albert J. Predota and Harry J. Kiefer, Cleveland, Ohio, assignors to The Glidden Company, Cleveland, Ohio, a corporation of Ohio.

A copper conductor coated with a heat-hardened synthetic resin coating of double-build class is disclosed, the resin solids of which comprise at least 20% resinous silicones and about 1-20% by weight on the silicones of at least one

IMPROVED, HIGH SPEED, SLIDE PLATE TYPE, HORIZONTAL WIRE BRAIDING MACHINE

HAVING 36 "MAX" WIRE CARRIERS FOR 3¾" DIA X 2" TRAVERSE BOBBINS.

- Twin-grip haul-off with infinitely variable speed drive.
- Production: 200|300 stitches per minute.
- Diameter of Horngear: 7.48".
- H.P.: 5.

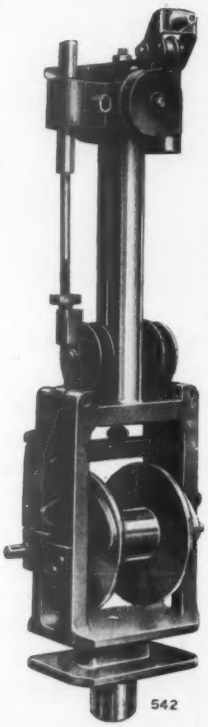


521

This machine also arranged with 2 speed electric motor drive for operation with Carters Yarn "Speedway" Carriers for package 6" traverse by 3" diameter.

B. & F. CARTER & CO., LTD. BOLTON, ENGLAND
TELEGRAMS: "BRAIDERS BOLTON"

MAKERS OF PLANT FOR ELECTRIC CABLE, BRAIDING & WIRE ROPE



542

"Max" High Capacity Wire Carrier

(Patented)

- For Precision Wire Braiding with Perfect Control of Wire.
- Balanced heavy tension by finger adjustment, tensions remaining constant whilst braiding.
- Tension obtained from 14 to 30 pounds.
- Bobbin easily loaded and removed.
- Simple wire threading, fractured and loose wires automatically held until drawn taut.
- Carrier robustly built with low Bobbin position.
- Horngear Speed: 100/150 revolutions per minute, maximum.
- Horngear Diameter: 7½ inches.

amine selected from triethanolamine, phenyl-beta-napthyl amine or butoxy methyl melamine.

★ ★ ★

No. 2,864,785, ENAMEL COMPOSITION AND ELECTRICAL CONDUCTOR COATED THEREWITH, patented December 16, 1958 by Malcolm Charlton, Cleveland, Ohio, assignor to American-Marietta Company, Cleveland, Ohio, a corporation of Illinois.

This enamel comprises a major proportion of solvent and a minor proportion of a composition comprising as the essential resinous ingredients thereof (a) a polyvinyl resin and (b) a phenoladelhyde resin formed from the condensation of at least 0.1 and not over 0.6 mol of formaldehyde with 1.0 mol of a reactive cresylic acid such as meta cresol or mixtures of meta-cresol and para-cresol containing less than about 2% of less reactive phenolic bodies, the ratio by weight of (a) to (b) being between about 2 to at least about ½ and about 2 to about 2¼.

★ ★ ★

No. 2,865,021, WIRE STITCHING MACHINE, patented December 23, 1958 by Mario P. Marzili, Fort Lauderdale, Fla.

There are twelve claims to this patent which includes V-shaped cross-sectional grooves in a wire guideway and V-shaped edge portions in a driver, for cooperation with the grooves.

★ ★ ★

No. 2,865,527, ARTICLE CARRYING CASE, patented December 23, 1958 by Egner L. Bloomquist, Minneapolis, Minn.

The case, with the exception of corner portions, is composed of wire bars for bottom, sides and ends.

★ ★ ★

No. 2,865,573, COIL WINDER, patented December 23, 1958 by Stephen V. Tarara and Paul E. Oberg, Minneapolis, Minn., assignors to Sperry Rand Corporation, a corporation of Delaware.

The inventor provides a shuttle operated winder for winding wire strand material around a closed core. There are twelve claims.

★ ★ ★

No. 2,865,574, CORE HOLDER FOR WINDING MACHINES, patented December 23, 1958 by Werner Blumentritt, Zurich, Switzerland, assignor to Micafil A.-G. Zurich, Switzerland.

The holder is for simultaneously supporting and affecting rotation of ring bodies to be wound. There are ten claims.

★ ★ ★

No. 2,866,364,WIRE DRAWING DIE BLANK AND METHOD OF MAKING SAME, patented December 30. 1958 by Paul Bieberich, Fort Wayne, Ind.

For forming a diamond die blank the inventor proceeds by forming a ring having a through bore, forming a receptacle having a bottom and a cylindrical wall which is thin relative to its diameter, a depression formed in the interior surface of the bottom to receive a diamond, the end of the receptacle wall being externally chamfered, inserting a diamond in the depression and the receptacle in the bore, folding the wall inwardly and compressing it downwardly by means of a punch having an end recess adapted to fit over and around the chamfered wall, to force the metal of the receptacle into intimate contact with the bore and with substantially the entire surface of the diamond.

Apex Announces New Group of Vinyl Compounds

The Plastics Division of Apex Tire & Rubber Co., Pawtucket, R. I., has announced the addition of a new group of vinyl compounds to its present line of materials for the Wire and Cable industry. These compounds, which are identified from #838 to #860, are unique insofar as they combine high and low temperature and high electrical properties, both in air and after prolonged exposure in water.

★ ★ ★

These compounds cover a range of hardnesses from medium soft to semi-rigid. The results after heat aging at higher temperatures indicate that they surpass the conventional 105°C compounds in this respect.

★ ★ ★

The presentation of good low-temperature properties, which are expressed in the brittle point data taken on aged samples, produce a

Cut unnecessary die refinishing costs

Next to diamonds and diamond dust NORBIDE* grain is the hardest manufactured abrasive commercially available. It costs 500 times less than sized commercial diamonds, bringing steady savings to refinishing operations on wire drawing dies — including ripping, semi-finishing, and, often, finishing. It will pay you to investigate the savings from NORBIDE abrasive. For details and prices write NORTON COMPANY, 45 New Bond St., Worcester 6, Massachusetts. G-350

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new approach in testing, that can be helpful in classifying these materials for new and more severe requirements for military and industrial applications.

★ ★ ★

Full data will be supplied upon request. Write for Data Sheet No. PD-1.

National Wiring Bureau Launches 1959 Residential/Commercial Wiring Promotion

Residential wiring promotion by the National Wiring Bureau, devoted primarily to helping electrical contractors take full advantage of the growing market for residential wiring modernization, was launched in the December issues of the electrical contracting trade press. The commercial wiring program, directed to both the customer and the industry, started in January.

★ ★ ★

The acceptance of the Residential Wiring Handbook as an American Standard will be actively promoted during the coming year. The book, now entitled "American Standard Requirements for Residential Wiring," will be brought to the attention of the building industry as well as to residential wiring personnel.

★ ★ ★

In addition, the Bureau will continue to publish the periodical bulletin, **Commercial Wiring Idea Exchange,** and to offer the materials already prepared for local industry use, such as the Powerating Sheets, How-To kits (a step-by-step approach to more contractor profits in the commercial modernization market), advertising mats, folders and postal cards with the "Electrifying Profits" theme, and customer brochures.

★ ★ ★

Additional information and samples of these materials may be obtained from the National Wiring Bureau, 155 East 44th Street, New York 17, N. Y.

New Stainless Steel Buyers' Guide

The Committee of Stainless Steel Producers, **American Iron and Steel Institute,** has published a new reference manual entitled: "Buyers' Guide for Stainless Steel Products and Services." This 159-page book lists approximately 3,000 firms which make products of stainless steel or offer services pertaining to stainless steel.

★ ★ ★

The first of its magnitude ever published for the stainless steel industry, the Guide is especially directed towards purchasing agents, designers and fabricators. It contains 188 specific and general stainless steel product categories followed by manufacturers' names and locations.

★ ★ ★

Copies of this "Buyers' Guide" are available in limited quantities without charge from The Committee of Stainless Steel Producers, American Iron and Steel Institute, 150 East 42nd Street, New York 17, N. Y., or from members of the Committee of Stainless Steel Producers.

The PESCHEL line

ELECTRICAL TEST EQUIPMENT FOR THE Wire Industry

MODEL H 20 AC/DC

HIPOT EQUIPMENT AND INSULATION TESTERS

Use economical "H" series of testers for accurate, non-destructive testing of equipment, components, and materials. Features include high sensitivity and very low corona level. 5 microamp circuit breaker, deenergizes HV. Adjustable, 5 to 5000 microamps. Detects leakage of 200 megohms per KV. Dual output a-c and d-c. Many models to choose from up to 120 KV.

Free literature sent. Other dielectric, overvoltage, breakdown, corona, fault counter, continuity, and leakage testers available.

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Cromwell Paper in New Office

Cromwell Paper Company moved its general offices to new quarters on the fifth floor at 180 North Wabash Avenue on December 1st.

* * *

Manufacturing will remain at the present two locations in Chicago—4801 South Whipple and 3048 West 48th Place, and at 1000 Nottingham Way in Trenton, New Jersey.

Orchard Paper Issues Inhibitor Paper Manual

The Orchard Paper Company, manufacturer of corrosion and tarnish inhibitor papers, has published a new "Orchard Inhibitor Paper Manual", now available to persons interested in rust and tarnish prevention.

* * *

According to **E. L. Orchard,** Manager of the Industrial Products Division, "the new Orchard Inhibitor Paper Manual contains the why, where, when, what and who concerning the war on rusting and tarnishing, a battle costing industry over 7½ billion dollars per year". The manual is the most comprehensive handbook of its kind ever offered to industry.

* * *

The book is amply illustrated, with use and application charts, case histories, and samples of all Orchard inhibitor papers.

* * *

The manual contains more than seventy-five pages divided in three main sections, 1) VPI (Volatile Corrosion Inhibitor) paper, for prevention of rust on ferrous metals, 2) Silver Saver, to eliminate tarnishing on silver and silver plate, and 3) Coppertex, which protects against corrosion on copper and copper alloys. Other sections contain general information relative to industry-wide corrosion problems, and actual samples of inhibitor papers.

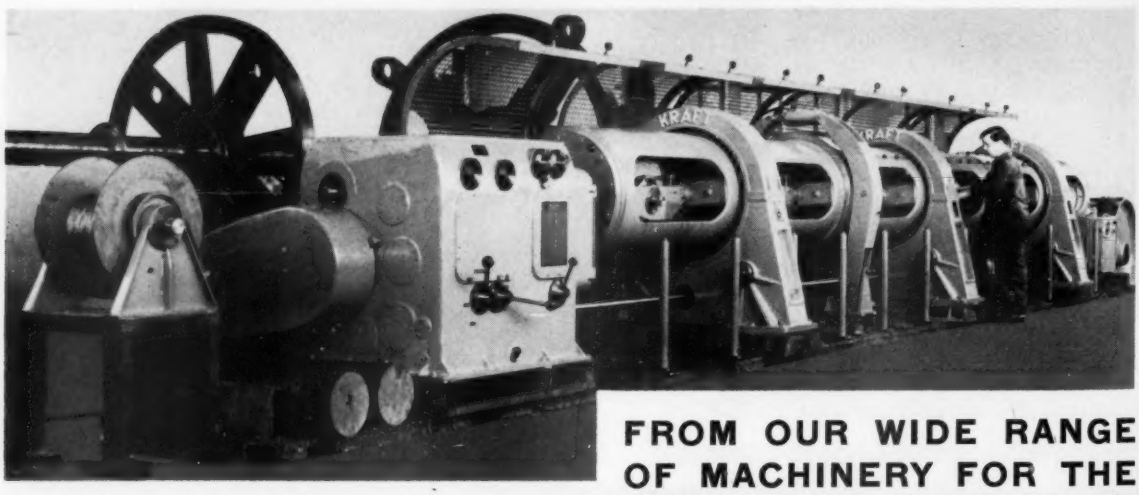
Qualified persons may obtain copies by writing on their company letterheads to: "Inhibitor Manual", % Orchard Paper Co., 3914 N. Union Blvd., St Louis 15, Mo.

To Sell Carl Zeiss-Jena Equipment Here

After an absence from the American market for a number of years the Carl Zeiss-Jena Optical Measuring Instruments have been made available by the **George Scherr Company.**

* * *

A pioneer for more than 30 years in the high-precision Industrial Measuring field, Scherr can now offer one of the most complete Precision Measuring lines in this country. The world-famous Carl Zeiss-Jena Optical tools include such items as Toolmaker Microscope with 6" by 2" range and Universal Measuring Microscope with 4" by 8" range, used for checking of cutting tools, control of gages, thread measurements



Shown here:

1+6 Bobbin Tubular High Speed Stranding Machine Type SVR 6.520
Bobbin size: 520 mm (20") flange diameter
Bobbin capacity: Approx. 300 kilos (660 lbs.) of steel wire.

FROM OUR WIDE RANGE OF MACHINERY FOR THE CABLE AND WIRE ROPE INDUSTRIES

J. A. KRAFT MASCHINENFABRIK, OLPE/WESTF., GERMANY
HANCOR, INC., 468 Fourth Ave., New York 16, N. Y.
SOLE REPRESENTATIVE IN THE U.S.A. AND CANADA

and Precision Measuring of jigs, fixtures and extremely accurate work.

★ ★ ★

These instruments, as well as Gear Testing Equipment, Comparators and other Precision Measuring Tools, are illustrated and described on a four page folder which may be obtained from the George Scherr Co., 200 Lafayette St., New York 12, N. Y.

Techalloy Expanding Plant

Techalloy Co. has announced a new half million dollar expansion program to keep pace with demand. A new 25,000 sq. ft. all-steel fireproof building is under construction to house the new machinery, and is expected to be ready for operation by April 1, 1959. New equipment will include:

One 6-hole multiple block heavy rod wire drawing machine; two intermediate HFV Vaughn wire drawing machines; six fine wire drawing machines; a large special atmosphere conveyor belt furnace for wire in coils or on spools, along with a special atmosphere quench furnace for heavy rods in coils; take-up facilities for thin strip in coils of widths from 12" thickness down to .001" in large heavy-weight coils; and a Fenn Tandem Turks head rolling mill for squares and shaped wire sizes up to ½" in diameter.

Tramrail Engineering and Application Booklet

A revised, up-to-date issue of Cleveland Tramrail Engineering and Application Booklet, No. 2008-N, has just been issued by the Cleveland Tramrail Division of **The Cleveland Crane & Engineering Co.**, Wickliffe, Ohio.

★ ★ ★

Detailed studies of track design, peening, and stresses are given. Also covered are various types of carriers, cranes, tractors, track switches, buckets, grabs and electrification. Dozens of photographs illustrating a wide variety of overhead materials handling installations are included.

CF&I Producing New Wire Rope

After several years of rigid testing, refining, and development a new extra high strength wire rope called "Double Gray" has been produced for marketing by **Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corporation,** it was announced by **F. S. Jones,** vice president.

★ ★ ★

Wickwire Double Gray Wire Rope is made of **extra** improved plow steel. It is fortified by an independent wire rope core of the same extra high strength steel. Double Gray rope has a 15 per cent higher breaking strength than the catalog breaking strength of an improved plow steel rope with IWRC. Extensive field and laboratory tests have demonstrated its superiority.

★ ★ ★

Since Double Gray lasts longer it quickly repays its slightly higher initial cost; down time due to nor-

WIRE ANNEALING and PATENTING with DEPENDABLE, PERFORMANCE PROVEN

AGF FURNACES

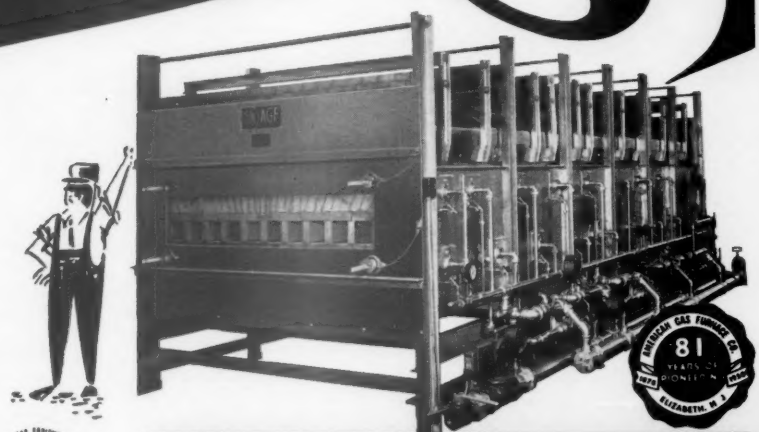
AGF single and multiple tube Muffle Furnaces, in a complete range of sizes for processing stainless and regular steel wire and strip, maintain protective atmospheres within the alloy muffles, to maintain or improve the surface appearance of the material being processed.

Removable roof covers provide easy access to the heating chamber and muffle tubes for maintenance and inspection, greatly reducing maintenance "down-time".

Advanced combustion system incorporates numerous specially designed AGF piloted combustion blocks of small heat input to provide TEMPERATURE UNIFORMITY which CANNOT BE OTHERWISE OBTAINED.

Multiplicity of burners and individualized control zone construction of heating chamber and combustion system permit EXACT regulation of any of the control zones at a desired temperature.

Write, today, for your catalog of AGF furnace equipment for the metalworking industry.



AMERICAN GAS FURNACE CO.

794 LAFAYETTE STREET — ELIZABETH 4, N. J.

"Standard of the Industry since 1878"

mal rope replacement is shortened, and the rope operates at a higher safety factor.

Wire Firm Changes Name

A major producer of specialty wire, rod, shapes, strip and foil has announced a name change, and at the same time, an expansion of facilities and services. The company is **Johnston & Funk Metallurgical Corporation,** Wooster, Ohio, formerly known as Johnston & Funk Titanium Corporation. The company is a wholly owned subsidiary of **Mallory-Sharon Metals Corporation,** Niles, Ohio.

★ ★ ★

The name was changed to embrace the long line of types and shapes of wire, strip and foil the company now produces, in titanium, zirconium, tantalum, columbium, molybdenum, and a wide variety of special steel alloys.

★ ★ ★

Johnston & Funk, in addition to its main plant at Wooster, operates the Mallory-Sharon Metals plant at Huntsville, Ala.

★ ★ ★

At the company's plants, facilities are maintained for ingot melting in electrode vacuum furnaces, billet conditioning, rolling, wire drawing, cleaning and pickling, wire straightening and strip and foil rolling.

★ ★ ★

The company is now also equipped to handle special research and quality control projects, relating to the development and use of common and rare metals in special applications.

Cobalt Data Sheet

The Cobalt Information Center now has available a data sheet on the metal cobalt. This new five-page publication includes general information on the element, data on electrical and magnetic properties, mechanical properties, high-temperature properties, transformations, diffusion, solubilities of oxygen in cobalt, and hot hardness. Also included are data on 99.6 per cent pure cobalt—ultimate tensile strength, elongation, reduction of area, elastic modulus versus temperature, etc. Alloy Digest sheets on cobalt-containing alloys are also available.

★ ★ ★

Requests for the new data sheet should be addressed on company letterhead to the Cobalt Information Center, % Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio. Requests from outside America should go to the main office, Centre d'Information du Cobalt, 35, rue des Colonies, Brussels, Belgium.

New Stitching Wire for Railroads

A new stitching wire for stapling railroad tie pads has been developed by **Prentiss Wire Mills, Riverside-Alloy Metal Division, H. K. Porter Company, Inc.** The special wire features penetrating strength, toughness and corrosion resistance, and was specially designed for Bird & Son, Inc., East Walpole, Mass.

★ ★ ★

HIGH VOLTAGE LAPPING MACHINE

20" PADS

8 or 16 PAPERS

CONSTANT TENSION ± 3%

POURTIER MACHINES

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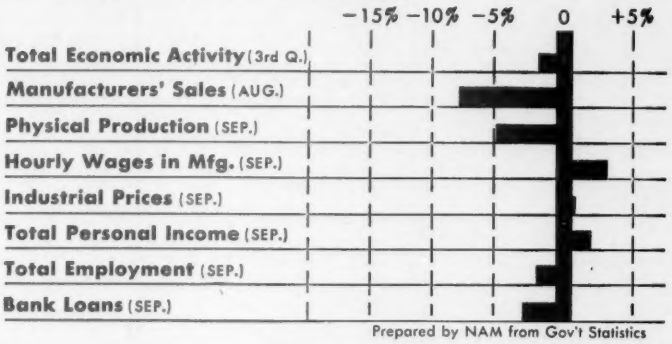
ROMAINVILLE (Seine) FRANCE

Bird Tie Pads are used by both American and Canadian railroads between the tie plate and the railroad tie to absorb vibration and prevent moisture from penetrating the under-plate wood, causing decay and tie failure. They add as much as 15 years to the life of the railroad tie. They consist of five layers of fabric covered with a special sealing coating. The new Prentiss wire is used to hold the five layers together. The tremendous vibration from railroad trains, only a few inches above the Prentiss stitching wire, has no effect on the "super alloy" wire.

NEWS FACTS ON ECONOMIC CONDITIONS-

UP OR DOWN — AT A GLANCE

Latest Data Compared with Year Ago



Prepared by NAM from Gov't Statistics

New Adjustable Speed Drive

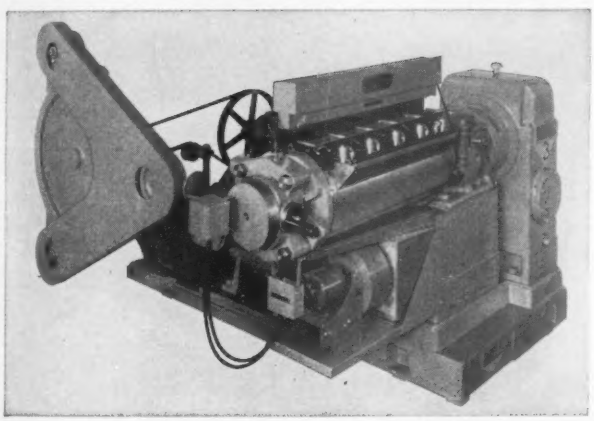
The Louis Allis Co. has announced the availability of the Adjusto-Spede® drive in ratings from ¾ to 7½ horsepower with a stationary field construction. All brushes, commutators and slip-rings have been eliminated, substantially reducing maintenance.

* * *

The redesigned construction in these ratings also reduces the length of the drive up to 22%. Both the A.C. motor and eddy current clutch are built into a common housing. The drive shaft, height and diameter dimensions are the same as a standard motor of comparable rating. Motor end brackets are now interchangeable with standard flanges and units can be flange-mounted to the driven machine for further space saving.

* * *

Bulletin 2750 gives dimensions and engineering information, including a cutaway of the drive's mechanical construction. Request the bulletin from The Louis Allis Co., Dept. P, Milwaukee 1, Wis.



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For Maximum Versatility

Whether you are extruding plastics that require high processing temperatures or quick-curing compounds Royle Spirod —the all purpose, all-electric, completely automatic extruder —provides positive temperature control. This versatility is the result of combining a proportioning controlled system of high velocity evaporative cooling with tubular resistance heating to supply constant, accurately zoned processing temperatures.

Send for Bulletin Number 463

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

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ALUMINUM INGOT AND MILL PRODUCTS AND MAGNESIUM MILL PRODUCTS: NOVEMBER 1958

(Shipments and receipts are in thousands of pounds)

Item	Number of companies reporting shipments	November 1958			October 1958* net shipments	November 1957* net shipments
		Gross[1] shipments	Receipts[2]	Net[3] shipments		
ALUMINUM PIG AND INGOT, TOTAL	90	179,303	93,011	86,292	93,339	92,194
ALUMINUM MILL PRODUCTS, TOTAL	152	236,776	20,123	216,653	254,023	186,993
Sheet and plate, non-heat-treatable	30	93,847	15,278	78,569	91,646	65,002
Sheet and plate, heat-treatable	4	(D)	(D)	17,783	19,332	13,093
Foil, including foil in lamination	14	(D)	(D)	18,205	19,468	17,144
Rolled, and continuous cast, rod and bar[4]	6	9,992	3,493	6,499	8,521	5,410
Wire, bare, conductors and nonconductor	16	4,044	250	3,794	4,536	3,191
ACSR and aluminum cable, bare	11	(D)	(D)	9,486	13,663	11,789
Wire and cable, insulated or covered	14	(D)	(D)	4,497	5,243	3,839
Extruded shapes, soft alloys	96	62,906	1,007	61,899	74,947	55,003
Extruded shapes, hard alloys	8	4,040	...	4,040	4,352	2,959
Drawn tube, soft alloys	12	4,514	...	4,514	4,976	3,396
Drawn tube, hard alloys						
Welded tube, non-heat-treatable	7	(D)	(D)	1,452	5763	640
Powder and paste						
Atomized and grained powder	3	521	...	521	474	372
Flaked powder	5	300	...	300	369	348
Paste	5	902	...	902	1,320	781
Forgings (including impact extrusions)	14	4,192	...	4,192	4,413	4,026
MAGNESIUM MILL PRODUCTS, TOTAL	10	(D)	(D)	1,661	1,983	1,230

*Revised.

D Withheld to avoid disclosing figures of individual companies. These figures are included, however, in the appropriate total.

[1]Gross shipments of mill products represent total shipments by producers to customers, including other producers, and shipments by producers to their own fabricating departments which manufacture products beyond the level of mill shapes. Ingot gross shipments include shipments by importers.

[2]For mill products, represents receipts from domestic producers only. In addition to receipts from domestic producers, 53,000 pounds of mill shapes were received through imports. For ingot, receipts from imports are included.

[3]For mill products, derived by subtracting the sum of producer's domestic receipts of each mill shape from the industry's gross shipments of that shape. Ingot data derived by subtracting all receipts from shipments reported.

ROLLER BEARING

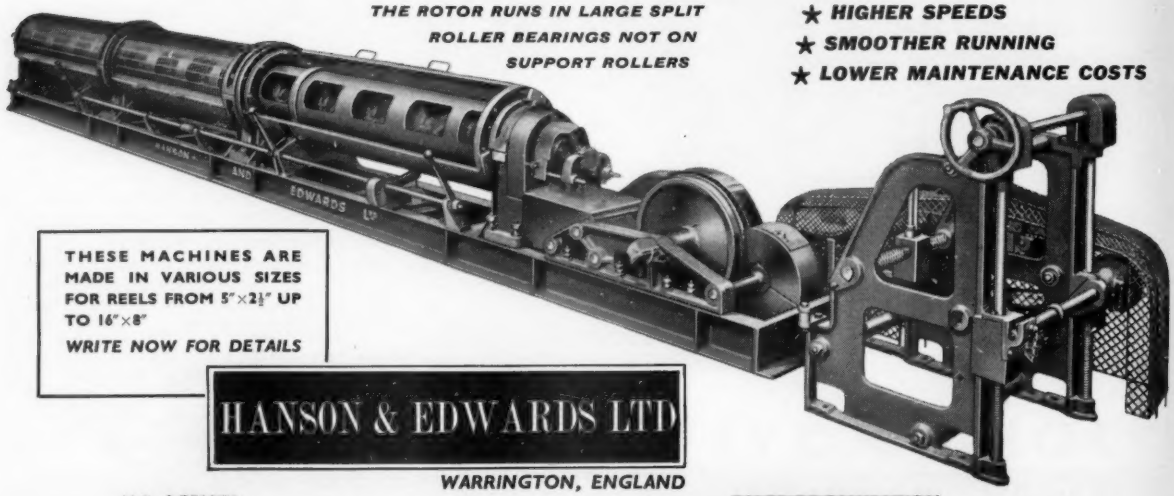
TYPE TUBULAR

STRANDING MACHINE

(EITHER SINGLE OR DOUBLE CAPSTAN)

THE ROTOR RUNS IN LARGE SPLIT ROLLER BEARINGS NOT ON SUPPORT ROLLERS

★ HIGHER SPEEDS
★ SMOOTHER RUNNING
★ LOWER MAINTENANCE COSTS



THESE MACHINES ARE MADE IN VARIOUS SIZES FOR REELS FROM 5"×2½" UP TO 16"×8"
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P 1686

Table I.—Demand for Copper-Base Mill and Foundry Products, 1958-59[a]

[Millions of pounds—metal weight]

Item	1958							1959	
	Second quarter		Third quarter		Fourth quarter		Year	First quarter	
	Stated requirements	Actual deliveries	Stated requirements	Actual deliveries[p]	Stated requirements	Estimated deliveries	Estimated deliveries	Stated requirements	Estimated deliveries
Brass mill products	29	467	30	452	30	450	1,819	31	460
Unalloyed[1]	4	194	5	176	5	175	713	6	180
Rod, bar, and wire	.....	22	.....	20	.....	.....	.....	.....	.....
Sheet and strip	.....	36	.....	35	.....	.....	.....	.....	.....
Tube and pipe	.....	112	.....	103	.....	.....	.....	.....	.....
Alloyed[1]	25	273	25	276	25	275	1,106	25	280
Rod, bar, and wire	.....	118	.....	126	.....	.....	.....	.....	.....
Sheet and strip[2]	.....	103	.....	110	.....	.....	.....	.....	.....
Tube and pipe	.....	31	.....	26	.....	.....	.....	.....	.....
Wire mill products[1] (copper content)	19	324	19	360	19	370	1,388	19	370
Foundry and powder mill products	7	194	7	199	7	209	811	7	214
Foundry products	.....	187	.....	190	.....	200	779	.....	205
Powder mill products	.....	7	.....	9	.....	9	32	.....	9

[a]Stated requirements represent military demand under the Defense Materials System (DMS); deliveries represent effective total demand, both military and non-military, as indicated by current information. [p] Preliminary. [1]Actual deliveries include imports of mill products (not available in detailed brass mill product breakdown); estimated quarterly deliveries exclude imports. [2]Includes military ammunition (from strip) on a cup-and-disc weight basis.

Source: BDSAF-83, BDSAF-84, Office of Civil and Defense Mobilization, and Bureau of the Census.

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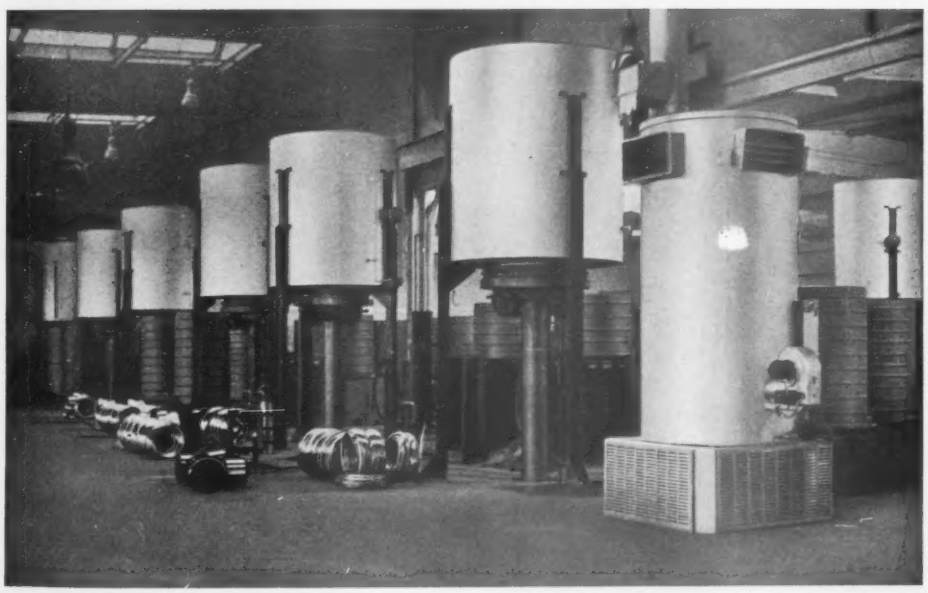

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The difference between just any spool or reel and Superior MPS CONVOLUTE DURA CURL Rims is well worth your close attention. Because now, with this exclusive MPS feature, maximum strength and rigidity are obtained throughout the reel heads. You can now have continuous trouble free high speed winding, without spool straightening expense. These new MPS spools also have the famous **No-Crev** feature.

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MPS CONVOLUTE Dura Curl Spools & Reels give you brute strength with dimensional precision, concentricity, and balance. Another patented MPS development engineered to **help you!**

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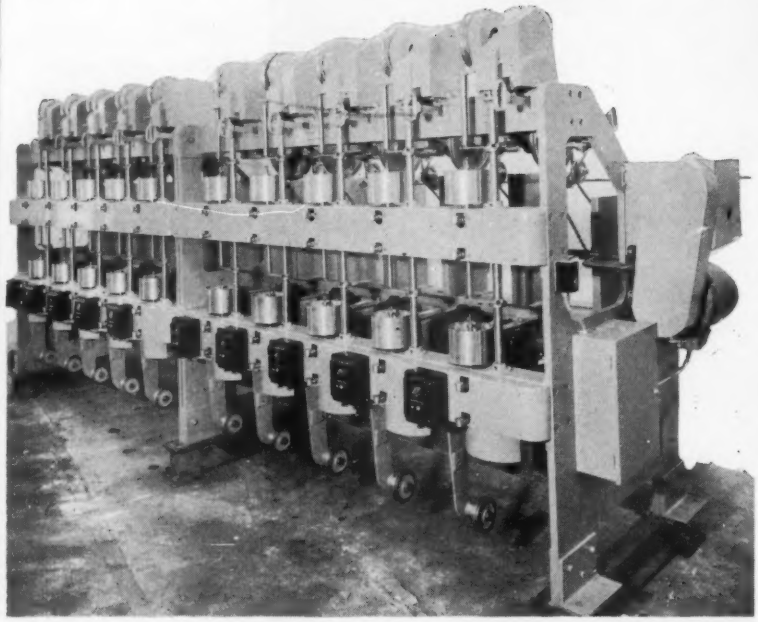
Division of Wanskuck Co.

2D-10-MBB INSULATION WINDING MACHINE No. 1129



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"American" AIMCO INSULATING MACHINERY COMPANY

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AIS 10

SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS
(Net Tons)

NOVEMBER - 1958
Month

Steel Products	Items	Current Month 1958 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1957) Percent of Total Shipments	Year to Date 1958 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1957) Percent of Total Shipments
Ingots and Steel Castings	1A	17,198	8,909	1,099	27,206	0.5	0.5	* 128,397	* 102,876	* 17,117	* 248,390	0.4	0.6
Blooms, slabs, billets, sheet bars	1B	78,548	30,281	1,540	110,369	2.1	2.3	* 725,459	* 272,504	* 14,695	1,012,718	1.9	2.9
Tube rounds	1C	800	234	23	1,057	-	-	7,308	1,766	75	9,149	-	0.1
Skelp	2	12,379	-	-	12,379	0.3	0.1	106,548	-	-	106,548	0.2	0.2
Wire rods	3	92,083	2,027	563	94,673	1.8	1.4	791,295	13,267	5,325	809,887	1.5	1.2
Total Semi-Finished	...	201,008	41,451	3,225	245,684	4.7	4.3	* 1,759,007	* 390,473	* 37,212	* 2,186,692	4.0	5.0
Structural shapes (heavy)	4	312,996	2,707	7	315,710	6.1	9.8	3,582,003	33,367	113	3,615,483	6.6	8.4
Steel piling	5	35,824	-	-	35,824	0.7	0.7	405,289	67	-	405,376	0.7	0.7
Plates	6	427,399	22,191	2,409	451,999	8.7	8.3	4,410,545	331,404	24,802	4,766,841	8.8	11.5
Bars—Hot rolled (incl. light shapes)	14	434,573	121,226	3,525	559,324	10.8	9.6	4,042,460	* 993,831	31,135	* 5,067,426	9.3	9.5
Bars—Reinforcing	15	152,369	-	-	152,369	2.9	2.6	1,891,763	-	-	1,891,763	3.5	2.9
Bars—Cold finished	16	82,075	16,134	4,049	102,258	2.0	1.7	747,389	127,050	38,740	913,189	1.7	1.7
Tool steel	17	876	5,725	-	6,601	0.1	0.1	7,630	55,805	-	63,435	0.1	0.1
Total Bars and Tool Steel	...	669,893	143,085	7,574	820,552	15.8	14.0	6,689,242	*1,176,696	69,875	* 7,935,613	14.6	14.2
Wire—Drawn	23	207,367	2,956	2,125	212,448	4.1	3.4	2,108,565	* 29,147	20,142	* 2,157,854	4.0	3.2
Wire—Nails & staples	24	28,027	-	1	28,028	0.5	0.5	396,154	-	14	396,168	0.7	0.6
Wire—Barbed & twisted	25	2,549	-	-	2,549	0.1	-	53,459	-	-	53,459	0.1	0.1
Wire—Woven wire fence	26	6,769	-	-	6,769	0.1	0.1	151,282	-	-	151,282	0.3	0.2
Wire—Bale ties & baling wire	27	1,137	-	-	1,137	-	-	55,501	-	-	55,501	0.1	0.1
Total Wire & Wire Products	...	245,849	2,956	2,126	250,931	4.8	4.0	2,764,961	* 29,147	20,156	* 2,814,264	5.2	4.2
Sheets—Hot rolled	31	626,005	24,311	3,043	653,359	12.6	11.0	* 5,381,935	189,467	25,732	* 5,597,134	10.3	9.8
Sheets—Cold rolled	32	1,117,927	3,057	10,614	1,131,598	21.8	18.3	8,936,958	32,694	103,053	9,072,705	16.7	14.7
Sheets—Galvanized	33	253,909	-	-	253,909	4.9	3.4	2,562,372	4	-	2,562,376	4.7	3.0
Sheets—All other coated	34	22,847	-	-	22,847	0.4	0.3	164,783	-	-	164,783	0.3	0.2
Electrical sheets & strip	35	3,172	41,782	-	44,954	0.9	0.7	30,239	397,420	-	427,659	0.8	0.8
Strip—Hot rolled	36	109,816	1,689	1,474	112,979	2.2	1.9	907,251	15,623	7,798	930,672	1.7	1.7
Strip—Cold rolled	37	79,790	1,265	16,758	97,813	1.9	2.1	730,349	10,781	139,374	880,504	1.6	1.6
Total Sheets and Strip	...	2,213,466	72,104	31,889	2,317,459	44.7	37.7	*18,713,887	645,989	275,957	* 19,635,833	36.1	31.8
Total Shipments (1958)	...	4,818,441	319,757	48,683	5,186,881	100.0	xxx	*51,001,565	*2,970,849	*443,772	* 54,416,186	100.0	xxx
Total — Prior Year (1957)	...	5,211,046	351,285	43,687	5,606,018	xxx	100.0	69,782,706	4,417,982	584,339	74,785,027	xxx	100.0

*Revised

123058

Sjogren SPOOLER

This machine is especially designed for wire mill use and incorporates many outstanding features adapted to present day high speed production.

SPEED — When placed directly behind wire drawing machine the Sjogren Spooler is capable of spooling at 1800 fpm.

CAPACITY — 100 pound maximum.

TRAVERSE — Hydraulic traverse is infinitely adjustable from zero to 5/8" per rpm of spool.

LOADING — Loading of spool is air-actuated.

TENSION — Louis-Allis eddy current clutch type motor with potentiometer for variable tension.

STARTING — Forced acceleration circuit prevents slack wire during wire drawing machine acceleration.

BRAKING — Goodyear airplane disc type brakes.

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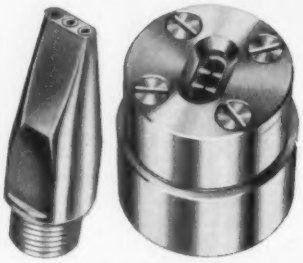
INSULATING DIES AND NOZZLES
for
EXTRA-HIGH ELECTRIC WIRE PRODUCTION



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Highest quality of workmanship and materials. Standard Types and Special Dies and Tips to your order.

CENTRAL CARBIDE NOZZLES have phenomenally long life; will lower operating costs and reduce wire breakage.

CENTRAL STEEL DIES are made in Round, Figure 8, Serrated, Tracer, and other special shapes to your specifications.

A newly designed Tru-Rip Die Assembly can be taken apart, cleaned, blades changed, and the whole reassembled easily and quickly. Made for 2 and 3 conductor wires to be coated in extrusion machines.

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Issues Electronic Wire Catalog

Beldon Manufacturing Company, Chicago 80, Illinois, lists 382 new stock items in its new Electronic Wire Catalog No. 859, which will be sent upon request.

* * *

This new catalog has been completely redesigned with all wires grouped by type and application

for easier use. Essential electrical characteristics and construction details are shown for each item. Typical listings include microphone and shielded power supply cables, TV camera cables, hi-fi, stereo, and phonograph cables, intercom and sound cables, and transmission line cables, plus a Conduit Capacity Table for intercom wire installations.

* * *

Also expanded for 1959 is Belden's package program which offers wire spooled in a larger variety of lengths to reduce handling costs and simplify wire stocking.

Announcing

The Completely NEW Robert J. Emory SPOOLER

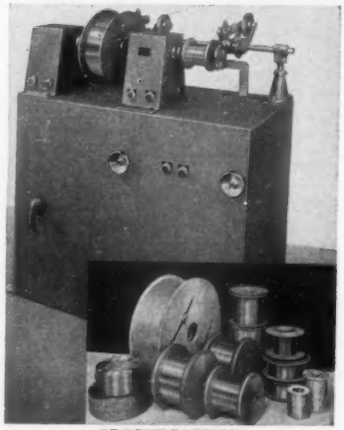
The New Model 1900-HVE Multi-Spindle Spooler (up to 16 Heads), engineered to include a variable speed system for adjustment of spindle speed, pitch, and traverse. This complete flexibility of adjustment makes a very uniform layer wound package which prevents binding and kinking during pay-off.

Multi-head machines are designed for one-man operation with such features as automatic stop on each spindle. A separate variable speed motor drive for each spindle. One machine can accommodate a wire range from #30 awg to #12 awg without change of gears or cams.

The 1900-HVE Spooler is a ruggedly built machine, using precision ball bearings at all rotating members. The adjustments are repeatable, and easily made while the machine is running. It is completely adaptable to the changing demands of the wire industry. A speed range of 18 to 1 is available. It contains the knowledge and experience of over 60 years of wire machine building.

Your special requirements can be incorporated in the design.

You are invited to consult us on your wire spooling problems. Our engineering resources and years of experience are at your service. Emory Winding Machines have been the standard of the industry. Most every major plant has Emory equipment.



SPECIFICATIONS

Size Range: .010" to .080" or heavier if soft, and many flat wire sizes. Max. Spool Size: 16" flange diam. Capacity: Usually 2 to 6 spindles.

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regularly

WIRE AND WIRE PRODUCTS

The Wire Man's Magazine

New Oval-Stitch Wire Developed

Oval-Stitch, the latest addition to **Chicago Steel & Wire Company's** family of quality stitching wires, is described in a newly-issued folder.

★ ★ ★

One of Oval-Stitch wire's most attractive features is economy, according to **James C. Steffan,** CS&W vice president, since the new product provides more stitches to the pound than standard wire. There are approximately 178 feet per pound of Oval-Stitch compared with an average of 146 feet per pound for standard wire.

★ ★ ★

Other features of the new wire are:

Uniformity of temper.
Accuracy of size.
Perfect feed control.
Elimination of waste.
Fits standard stitching machines.
Copper or galvanized finish.
Put up in 5, 10, 25 & 50 lb. coils.

★ ★ ★

Samples and descriptive folder on the new product are available from the Sales Department, Chicago Steel & Wire Company, 10257 Torrence Ave., Chicago 17, Ill.

New Drum Packaging Equipment for Wire Announced

The Advanced Wyrepak Co., Inc. a corporation organized in 1958, has announced the development of new drum packaging equipment for ferrous and non-ferrous wires that is said to be the most advanced, fastest and efficient so far produced for the wire processing industry.

★ ★ ★

The concern, associated with the **Vaughn Machinery Company,** has complete engineering, manufacturing and service facilities under the direction of men of outstanding experience in this type of equipment.

★ ★ ★

The new equipment, which has been field-tested, is produced under a license granted by the Continental Can Company, which controls the basic patents.

★ ★ ★

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FOR ELECTRIC CABLE, WIRE AND WIRE ROPE
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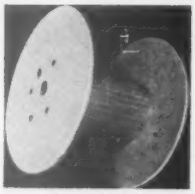

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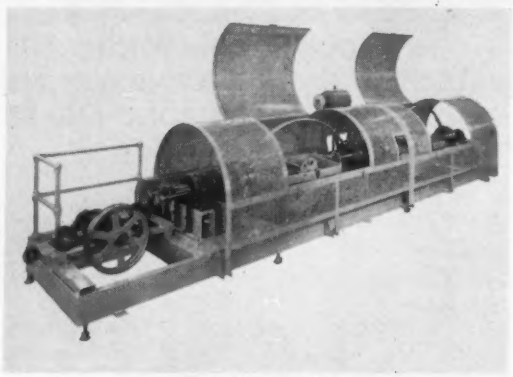

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Low Power Consumption	**5 H. P.**
High Efficiency	**87% to 92% on a 24 hour basis.**
Extremely Versatile	**Will twist a large variety of conductors.**

This type machine made to handle reels 24 and 30 inches in diameter—Heavier and slower machines handle reels 36 and 48 inches in diameter.

Write for further information on this low cost machine.

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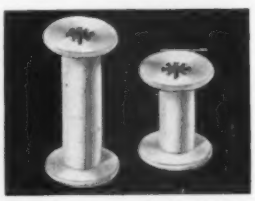

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157 Clifford Street • Providence 3, R. I.

In the March Issue of WIRE AND WIRE PRODUCTS the company will publish a picture and description of the new take-up packaging magnet wire, and subsequent advertisements will cover other equipment and applications.

★ ★ ★

For additional information, you are invited to contact the company at 11 Harrison Court, Bridgeport 1, Conn., or the Vaughn Machinery Co., Cuyahoga Falls, Ohio.

New Electrical Varnish Announced

A clear, fast air-drying insulating varnish, which protects electrical and electronic equipment from fungus attack has been developed by **Schenectady Varnish Company, Inc.,** Schenectady, N.Y.

★ ★ ★

Designated No. 642-AF Fungicidal Insulating Varnish by the firm, it is applied to the surface of instruments, transformers, printed circuits, ceramic resistors, insulators and other electronic equipment subject to fungus attack in hot, humid climates.

★ ★ ★

No. 642-AF Varnish is water white in color, will not "after-yellow" and is, therefore, ideal for application over stamped or painted identifying numbers, it was said.

★ ★ ★

For properties and other data, please write the company.

The High Speed Dual Take-Up

(*Continued from page* 201)

ing especially designed to best support the take-up in its high speed operation.

1. **A compact and efficient wire reservoir to provide the wire storage necessary at "crossover," and to effect drive and tension control as noted previously.**
2. **A high speed dependable measuring unit equipped with a preset electric counter to supply, at proper intervals, the electrical impulses required for fully automatic operation.**
3. **A drive control panel housing all necessary control components set to provide the automatic cycling and control.**

Serviceability

This becomes a major factor in wire production where requirements force extremely high duty cycles on equipment. The High Speed Dual Take-Up must be serviceable to the point where it imposes no additional "down time" for servicing beyond that normally required for successful operation.

* * *

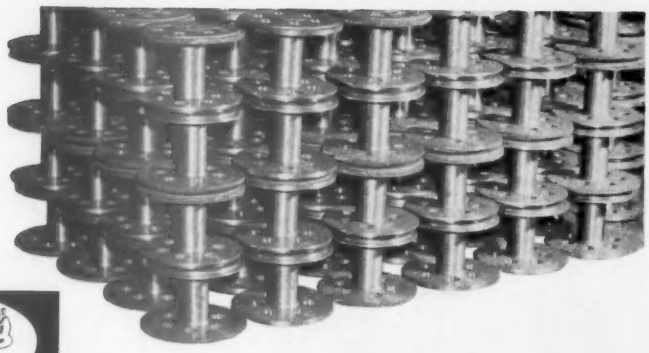
For this reason our design has been based on this extremely high duty cycle as regards bearings and transmission components. Lubrication points have been minimized and made readily accessible. Chassis design is of substantial fabricated steel construction, with adequate access panelling for ease in servicing.

Last, and Most Important, Safety in Operation

The need for operators safety, especially in a high speed operation, is readily evident. A prime source of potential danger in any continuous operation is the possibility of automatic "crossover" being effected while the operator is in the process of reel changing. This situation is further aggravated at high speeds by the potentially shorter interval between reel changes, and must be adequately guarded against. To satisfy this requirement, we have provided an electrical interlock system to warn the operator in the event he has not changed reels within a preset time interval before the effecting of automatic "crossover." This system also stops the "crossover" from being effected at any time reel changing is in process, and then can only be effected manually after the reel change has been completed.

* * *

We have further provided for sliding panels to cover the reels while the winding operation is in process and adequate guarding of "snagging" discs, wire cutter, traversing components where practicable, and all drive and transmission components.



Woods

VERSATILE DUCTILE IRON SAVES MANUFACTURER 20 TO 30%

WHAT CAN IT DO FOR YOU?

One of the nation's leading manufacturers of wire rope is saving 20 to 30% by using Wood's one-piece, cast ductile iron spools for stranding steel wire. In addition to cost savings, these spools also offer outstanding physical advantages over previously used fabricated steel and cast malleable iron types. Wire frequently snagged in crevices of fabricated steel spools, causing production delays, spool damage, wire waste. Malleable iron spools were subject to nicking. Flanges bent. This damage has been sharply reduced with the use of tough, resilient Wood's ductile iron. Check the many advantages and applications of this remarkable metal. WRITE FOR BULLETIN 1102.

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A RUGGED, DEPENDABLE Wire Measuring Machine *for fast, accurate runs!*

Wire is easily "loaded" into measuring machine from the side or the rear without having to feed through guide bushings. Brake stops measuring wheel instantly when wire leaves measuring rolls. Predetermined units will automatically stop wire at desired length. Very accurate speeds to 2500 ft. per minute.

MODEL "L-25" Capacity .030 to 1 in. Tachometer to govern rate of speed is optional.

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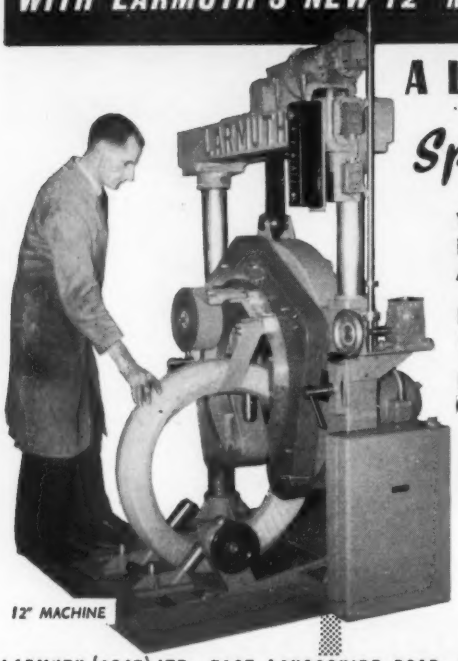

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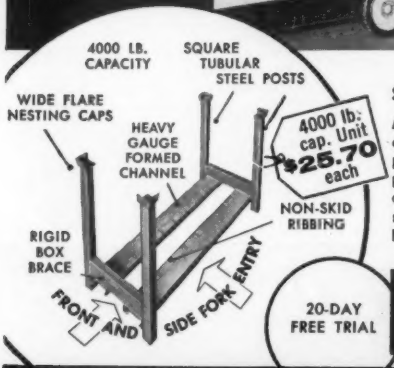

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MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY • STEELMOBILE

Some Aspects of Dual Take-Up Economics and Design

(*Continued from page* 200)

traverse from 2¾" to 6"; and with varying barrel diameters. In addition, the reels vary in construction from round to square bore and from plywood to cardboard. The universal chuck previously discussed, will accommodate all these reels.

★ ★ ★

There are also three widths of surround band and numerous core types to be printed.

★ ★ ★

Quick adjustment for all these variations is built into the machine so that the Operator needs no tools for setting, and down time can be kept to a minimum.

★ ★ ★

The surround band applicator is self-compensating for reel diameter, and operates in a similar manner to the tying device on the automatic coiler.

★ ★ ★

Many savings on printing costs, surround band overlap and cable wastage are made in addition to the obvious labour economies. See Figure 11.

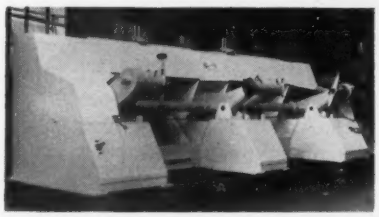

Fig. 11—ST.48/72 dual reeler, front view.

An example of a completely different dual take-up is the machine shown with a reel capacity up to 6 ft. diameter, and with a load capacity of 5 tons. The problems here are concerned with drive efficiency and braking. The machine requires only 3 h.p. and is fitted with an eddy-current coupling drive. The cable is changed from one reel to the other on the run, but using external hydraulic shears and clamps. See Figure 12.

★ ★ ★

It is impossible to cover all the aspects of automatic take-up eco-

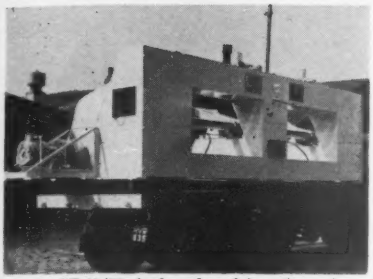

Fig. 12—ST.48/72 dual reeler, drive view. * *

nomics and design in so limited a space and this paper can only give an outline of the possibilities and problems connected with these machines. Certainly the basic problems in these machines are now mastered, and the way is open for further developments in ancillary equipment and automatic handling to improve the quality of the product and reduce material wastage and labour costs.

Ardox Nails Prove Efficient

Officials of Admiral Homes, Inc., report that the use of a spiral nail in the prefabrication of wall panels has resulted in increased efficiency on the assembly line.

★ ★ ★

The company, which builds approximately 700 homes a year, has adopted Ardox Spiral Nails, made by **Jones & Laughlin Steel Corporation,** for practically all of the fastening for which they formerly used smooth shank nails.

★ ★ ★

One of the biggest advantages of the spiral nail, the company reports, is that it eliminates splitting. Consequently, there is no lost time on the assembly line in replacing lengths of wood that are not acceptable.

★ ★ ★

Tests have revealed that the Ardox Spiral Nail—which operates on the same principle as the screw—has as much as 200 per cent more holding power than the smooth shank nail.

★ ★ ★

Although the Ardox nails cost more per pound, they cost less per nail, since there are more Ardox nails in a pound than conventional nails.

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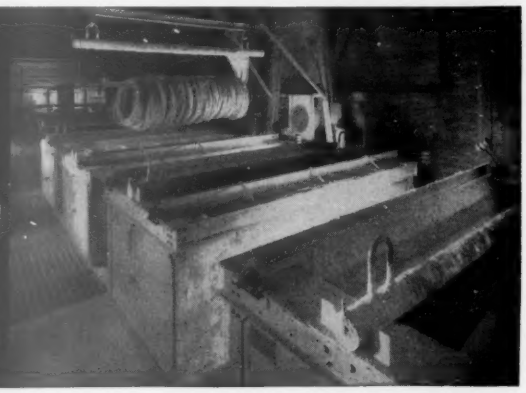

Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

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Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
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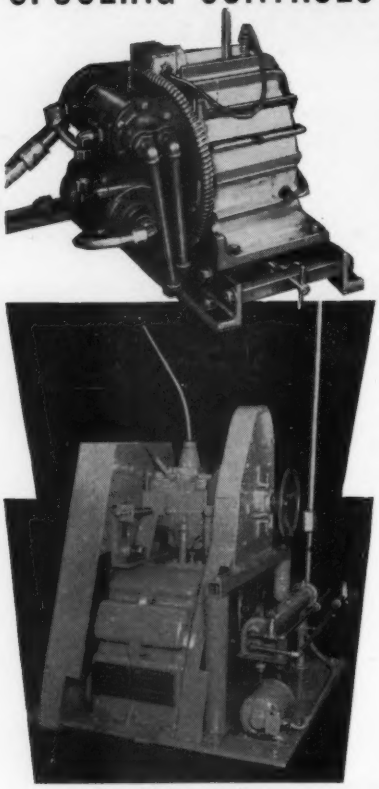

Illus.: Unit in operation on 75HP Capstan Holdback.

Tensolite, Anaconda, Plastoid, National Standard, Johnson Steel & Wire, Pittsburgh Steel, Boston Insulated Wire, Worcester Wire and a host of other wire producers found out that for successful SPOOLING
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Symposium on Electrical Testing Discussions

(*Continued from page* 194)

er this was a safety factor for the operator or what, since the operator would not be expected to come in contact with the test part of the circuit. Mr. Gillett said they did occasionally. At one time 100 milliamperes was considered safe, then it went to 40, and now it is 10. They are made this way because safety regulations require it. 6 milliamps are said to be quite safe. Mr. Entwistle said he had taken 150 milliamperes DC with no ill effect.

★ ★ ★

Mr. Huether said that in Canada they used 100 milliamps, but they provided safety features, and their personnel had never had an accident. To safety interlocks and warning signals, they also have a continuous program of safety education. Where high voltages are used—above 30 KV—the areas are isolated and are under the supervision of technical engineers only.

★ ★ ★

Mr. Bodle said that even with 10 milliamps AC, a man touching the mechanism could not let go of the electrode. Ordinarily 100 milliamps was in a dangerous range and could affect the heart to such degree that resuscitation procedures could fail. A device should be developed to disconnect automatically if someone got even a 10 milliampere shock. With DC, one could go up to 15 milliamps with the same degree of safety as 10 milliamps AC.

★ ★ ★

Returning to the matter of ratio between AC and DC spark testing, on which there appeared to be a difference of opinion, a member asked if the same figures will hold for all insulating materials. Mr. Bodle said that in his paper (to be given on Wednesday), he had a table that relates PVC, rubber, and other materials for AC, DC and surge tests, from which someone might be able to deduce inferences.

★ ★ ★

Mr. Bamber said the spark tester was designed to show up pin holes,

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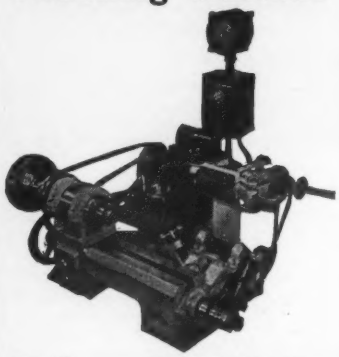

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Save ½ labor costs—

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The Standard of the Wire Industry

and that for the time the wire was in the electrode, the insulation was not receiving an actual stress. If 2 mils of a 4-mil insulation is left, should a high voltage be used to bring the 2 mils down? He said he believed the only purpose was to locate the pin holes and that sparking did not replace the water test. It was never intended to do so. AC or DC in spark testing is a matter of choice, and if a wall has been brought down to 2 mils, a high voltage could destroy the wall as thickness decreases. In telephone specifications on a dry test, one can have an AC or a DC test. He prefers DC because if there is a breakdown in a multicord cable as a result of the DC stress, no damage will occur to the AC paths. They use approximately 5,000 volts AC and 10,000 volts DC.

★ ★ ★

A member said he was referring to breakdown, not spark testing. Mr. Bodle said that was a static test—his company was interested in finding weak insulation. AC has some disadvantages; DC can be adjusted to get the kind of tests wanted.

★ ★ ★

Another man had two questions, one on breakdown as opposed to non-breakdown; he wanted to know how the information was presented to the operator and whether he was the one who decided what to do about fault conditions. Mr. Slade said this was up to the operator. The strip chart has a straight line if there is no ionization. Any deviation up to about 1/32nd of an inch indicates a fault. One of the headaches is the throwing of switches in the plant, which makes a momentary pulse, but the ionization indication usually extends over several inches of the chart.

★ ★ ★

The second question again was on the importance of knowing the distance from the end of the cable up to the fault. When information is given to the re-wind operator, what does he do with it? Mr. Bamber said it was quite simple. If the extruder operator had trouble with the first thousand feet, he would mark this down. There may be 20 pin holes in the first 100 feet, and

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then for the next 30 or 30 thousand feet, no faults at all. The matter is a question as to whether to repair or discard the first length. All the operator needs is the strip showing the footage points of the faults. From this he makes a decision.

★ ★ ★

A question as to whether the bead electrodes could be made more efficient so that the water test could be eliminated, was answered by Mr. Entwistle. He said he had suggested a method in his paper that he felt was good only at low voltages. With 2,000 to 2,500 volts, moistening can be used to increase conductivity on the wire surface. It does not wet the wire—only dampens the surface.

★ ★ ★

Mr. Bamber said he had operated the gear made by Mr. Slade, called a "corona locator," which is used for testing high voltage wire. It locates internal cavities that do not show up on spark testing.

Design Requirements of High Speed Take-Up Operation

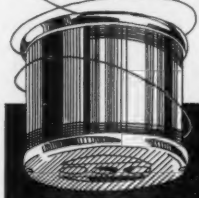
(*Continued from page* 196)

speed and reel build-up. For all practical purposes, the dancer arm remains always in one position, with only the slightest outward movement giving the full speed range. Any inward movement gives a complete range of controlled eddy current braking instantly from a small amount all the way to brake full on. A coordinated but separate drive is included for the traverse. This drive automatically picks up its signal from the proper reel drive, without the use of clutches, to give uniform traverse.

★ ★ ★

Briefly we have outlined some of the most important problems related to high speed take-up work, and our approach in design to the solution of these functions. By necessity, fully automatic take-ups, to run at extreme speeds, become more complex, and more expensive to build. However, the industry as a whole has been moving ahead very rapidly in a very short time, and we feel that all concerned should realize how much pioneering thought and expense has gone into making these high speeds possible.

Fine Wires



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Dual Takeup Stands, N.E.B. Upright Twisters, Sinfra Knitters, 30" Takeups, Serving Equipment, Stranders, and many other types of wire and cable equipment.
All Machines Reconditioned in Our Own Shop
WIRE & TEXTILE MACHINERY INC.
P. O. BOX 436, PAWTUCKET, R. I.

To Sell—
Advertise in
WIRE AND WIRE PRODUCTS
It pays—
Send for rates
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For
WIRE
DRAWING
Warner
BELL MINE
LIME
PRODUCTS
Strict laboratory control assures uniform quality
Pulverized Quick Lime
Hydrated Lime
Pebble Lime
WARNER COMPANY
Sales Offices
Bellefonte Philadelphia
Pittsburgh New York

★ ★ ★

"You can't sink half a ship . . . You can't sink management and let labor stay afloat. You can't sink labor and let management stay up. You can't guarantee that one-half of the ship is always going to get paid unless you can somehow guarantee that the other half of the ship will always have the money to pay the first half . . . Let's keep the ship afloat. We're all on it."

—General Electric Newsletter
West Lynn, Massachusetts

★ ★ ★

Some Notes on Spark Testing

(*Continued from page* 192)

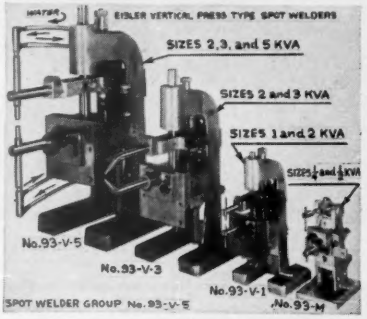
as a result of the adoption of a new figure of 10 milliamperes on the part of most authorities as a safe testing current, the new line of Spark Testers which we have introduced this year will have an automatically-controlled short-circuit secondary current of between 9 and 10 milliamperes throughout their entire testing range. We, therefore, have a short-circuit capacity which is sufficient to maintain the test voltage regardless of leakage conditions, and one which is absolutely safe for an operator at any test voltage. This value of 10 milliamperes is also low enough so that no additional damage is done to the insulation when a fault is located. This feature is augmented by the fact that in all our Spark Test applications, except on Extruders, the Sparker is cut off the line automatically one-half second after the fault is located. This feature is also beneficial from the safety standpoint as well.

Spark Testing—Continuous Inspection Tool

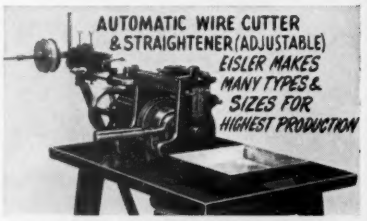
(*Continued from page* 188)

that we may intelligently decide to rebuild or pass the section indicated on the recording. While this work has been confined to higher voltage cables, efforts are being made to use similar principles on low voltage wire and thus obtain a measure of quality beyond the go or no-go type of sparker unit.

Eisler Makes The Largest Selection of Small Spot, Wire, Butt, Seam and Foil Welders. Send for Cat. #93-57
A WELDER FOR EVERY PURPOSE



Wire Cutting-Straightening and Forming Machines for All Types of Wire



EISLER ENGINEERING CO., INC.
CHARLES EISLER, Jr., Pres.
747 South 13th St. Newark 3, N. J.

USE
"MAJIMA"
WIRE WORKING MACHINERY
For all types of formed wire products—sturdy accurate and PRICED RIGHT

MACHINES FOR NETTING, BARBED WIRE, PINS, HEADED PRODUCTS, SCREWS, SPRINGS, ETC.
Send for
CATALOGUE & PRICE LIST
Write or phone
TAKEMURA & CO., LTD.
Sole Representative
Care of HOTEL WELLINGTON
55th St. & 7th Ave., New York, N.Y.
Tel: Circle 7-3900

THE WIRE ASSOCIATION
invites wire men to join the organization and participate in its activities.
Write for a booklet on what it is and how it functions to
RICHARD E. BROWN
Executive Secretary
453 MAIN STREET STAMFORD, CONN.

WICKWIRE BROTHERS, INC. CORTLAND, N.Y.

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RUST PREVENTATIVES LUBRICANTS

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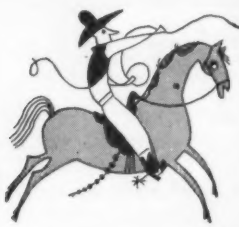

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DEPENDABLE USED WIRE AND ALLIED EQUIPMENT WEST OF THE MISSISSIPPI AND IN THE PACIFIC EXPORT AREA. LARGE STOCKS CARRIED. IF WE DON'T LIST WHAT YOU WANT, FOR GOOD USED WIRE AND CABLE AND WIRE ROPE EQUIPMENT, ASK FOR IT.

SOME EQUIPMENT ON HAND:

Takeups, Payoffs, Braiders, Asbestos Carding Lines, Taping Machines.

13 Die Copper Rod Breakdown Machine with Cook M-1000 Spooler Takeup

WESTERN WIRE & TEXTILE MACHINERY, INC.

230 Shaw Road Tel: JUno 9-1101 So. San Francisco, Calif.

MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .3437"
45 sizes Bright Tinned, .003" to .125"

Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire,
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000
in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.
Dental and Surgical Wires, large assortment.

THE MALIN & COMPANY

2514 Vestry Ave. Established in 1884 Cleveland 13, Ohio

Maintenance and Testing of Wire Sparking Equipment

(*Continued from page* 186)

"Decatron Counter" is offered now in some quarters on new equipment. It is a corallory of the storage and read-out circuits.

★ ★ ★

The "Fault to Footage Counter" is not to be confused with the standard "Number of Faults" per reel type of circuit. This information is being demanded more and more to provide a fault "profile" in the reel, particularly in multi-conductor work.

★ ★ ★

"Audible-Visual Warning at Preset Level" is easily accomplished by means of pre-determining counters.

★ ★ ★

Again, the writer would stress that possibly all of the functions represented in this block diagram are not required in every case. We at Canada Wire are at present working on fault storage and read-out circuitry because of a real need for same in the immediate future.

★ ★ ★

The position of the KV meter was varied in the illustrations to show various places where the KV voltage could be monitored.

★ ★ ★

Transformer manufacturers say that for accuracy, the best KV monitoring position, voltage wise, is a meter winding on the secondary leg of the KV Transformer.

★ ★ ★

The writer wishes to thank the audience for its kindness and consideration and hopes that what was discussed may be of some small value to those who, like himself, have anything to do with wire sparkers.

TO SELL—ADVERTISE IN
WIRE AND WIRE PRODUCTS
It pays—send for rates
453 Main St., Stamford, Conn.

Electrical Spark-Testing

(*Continued from page* 181)

detector, the sensitivity is readily adjustable. This permits operation of the Wire Sparker at any desired sensitivity to suit different conditions of charging current, humidity and test voltage.

* * *

To insure reliable testing, a malfunction circuit has been incorporated into the electronic detector. An audible signal is given in the event of failure of any of the major components in the detector.

* * *

The requirements of non-destructive testing and operator safety have been met by using a current limiting network in the Wire Sparker. This network limits the output current from the sparker to six (6) milliamps at any test voltage, which minimizes burning of the insulation at a fault, and provides greater safety for operating personnel. Due to the ability of the electronic detector to operate on very small signals, limiting the fault current is made possible with no sacrifice in sparker performance.

* * *

The features described above represent the innovations in our sparker designs as a result of modern production requirements. These features, combined with the equally important requirements such as ruggedness, trouble-free operation, ease of maintenance, and reliability, constitute our design approach to modern spark-testing equipment.

Value and Application of Sparkers

(*Continued from page* 187)

neglected instrument, the sparker now has to advise you, under conditions of fine limits, increased requirements and keen competition. It should be designed and used as such.

STRONG METAL BOUND RETURNABLE REELS

FAST DEPENDABLE SERVICE ON QUALITY REELS, 12" TO 30" DIAM.

Built to take a beating! Built to protect Coated or Insulated Wire from damage! Kiln dried stock — No nails — Bolted, Waterproof, Glued construction. Especially designed to prevent breaking or splintering.

We Can Solve Your REEL Problems!

WM. McCASKIE, INC., OLD FORGE ROAD, WESTPORT, MASS.
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FILTERING MATERIALS—KNITTED AND SCRUBBLE

Ferrous and Non-Ferrous. Flat and Round.
For Vibration and Shock Absorbing Cushions, For Electronic Shielding.
For Filter, Mist Eliminators and Sound Muffling.
For Air Conditioning and Oil and Gas Filtration and Entrainment.
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THE MONTGOMERY COMPANY
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25 CANAL STREET Tel.: National 3-3336 WINDSOR LOCKS, CONN.

WIRE DRAWING MACHINERY
AND EQUIPMENT

FINE WIRE MACHINES • SPOOLERS • POINTERS
PATENTING, TEMPERING, GALVANIZING AND TINNING EQUIPMENT FOR WIRE
Wire Blocks Made to Suit Your Needs.
WRITE FOR PRICES
SUPERIOR TOOL & MANUFACTURING CO.
SHREWSBURY STREET WEST BOYLSTON, MASS.

NIEDERRHEIN WIRE RODS

Open hearth grades from low metalloid through high carbon, Thomas grades, cold heading and special grades for sensitive applications. Heavy coils up to 880 lbs.—I.D. up to 33½". Sizes from .200" to ¾".

Reliable delivery schedules at a fair price.

NIEDERRHEINISCHE HUETTE A.G.,
Duisburg, Germany

KURT ORBAN COMPANY, INC.
34A Exchange Place, Jersey City 2, N. J.
In Canada: Kurt Orban Canada, Ltd.,
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Wire Marking

Type SM MARKER

FOR USE ON C.V.'S, PLASTIC EXTRUDERS, REGULAR INSULATORS, COILERS
- For Hot or Cold horizontal marking at the extruders or as a separate operation.
- Does not require cleaning other than for color change.
- Eliminates flat wire and also ink evaporation.
- Flat, concave or special wheels.
- Accommodated diameters of from .010" thru 9.00".

In the marking of extruded material there are BIG advantages in ONE single source of supply.

1. Know-How
2. Inks
3. Wheels
4. Machines

GEM GRAVURE CO., INC.
WEST HANOVER, MASSACHUSETTS
Tel.: Rockland, Mass. TRiangle 7-0456
WEST COAST REPRESENTATIVE:
Paul I. Kenner Co., 230 Shaw Road, South San Francisco, California

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DIAMOND POWDERS

For Consistent High Quality

They Are ALWAYS Clean, Sharp and Accurately Graded for Use.

ONLY TOP QUALITY GRADES!

SPECIAL SERVICE

DIAMOND POWDER RECLAIMING

Our exclusive process gives maximum recovery, highest salvage. Send us your old cotton, die washings, sludge and wheels.

DIAMOND GRINDING WHEELS

A complete line of fine quality wheels for industrial production.

Write for information and prices on our several services.

NATIONAL RESEARCH COMPANY
25530 LITTLE MACK AVE.
ST. CLAIR SHORES, MICH.

Outstanding Personalities of the Wire Industry

(*Continued from page 225*)

to The Rhode Island Insulated Wire Company.

★ ★ ★

The Company he now heads is a producer of plastic wires and cables for the telephone, railroad, municipal, utility, industrial and power industries. The firm's main plant and offices are located in Ashton, R. I.

Alpha Metals Announces New West Coast Expansion

Appointment of **Richard E. LeBlond** as west coast field manager of **Alpha Metals, Inc.,** Jersey City, N. J., has been announced by **Harold Shonberg,** President.

★ ★ ★

He replaces the distributor organization which formerly represented Alpha Metals in this area. The new field manager's territory includes the states of California, Oregon, Washington, Utah, Arizona, Colorado, New Mexico and Montana.

★ ★ ★

Address of Alpha Metals' west coast office is 2343 Saybrook Ave., Los Angeles 22, California.

Connecticut Spring Announces Promotions

The Connecticut Spring Corporation of Hartford has announced the appointment of **John Torda** as assistant to the vice president in charge of company operations, and **James T. Gallagher, Jr.** as general sales manager.

★ ★ ★

Mr. Torda had previously been Chief Engineer and General Sales Manager of the Organization. He has been with the company since 1944.

★ ★ ★

Mr. Gallagher joined the company in 1948 and had been its regional sales manager for the New England area.

Entwistle Appoints Kenner for West Coast Sales

The James L. Entwistle Co., 100 Glen Road, Cranston, R. I., manu-

CENTURY

VINYL COLOR CONCENTRATES FOR WIRE & CABLE COATINGS

ALL COLORS CONFORM TO N. E. M. A. STANDARDS

The quality is superior both as to color and electrical properties, all colors are sharp and clear, and the dispersions are excellent. This permits a minimum use of the concentrate, lowering costs.

Send for working samples

CENTURY PRODUCTS CO.
14324 Birwood, Detroit 38, Michigan
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BEHR MANUFACTURES SINGLE and DOUBLE STROKE COLD HEADERS

IN ¼" X 2" CAPACITIES FOR UPSETTING AND FORGING BOLTS, SCREWS, RIVET HEADS, AND OTHER SIMILAR SHAPES

CALL ROCKFORD 2-7721 OR WRITE FOR COMPLETE LITERATURE and PRICES

MANVILLE 250C HEADER PARTS AVAILABLE FROM STOCK

BEHR MACHINERY & EQUIPMENT CORP.
1210 SEMINARY ST.
ROCKFORD, ILLINOIS

YES
IT'S HERE

The Tinning Die that really works.

Heanium Dies and Nibs are a great economizer when used for applying heavy tin coat to wire. Metal does not adhere to polished Heanium allowing it to be used in place of more costly materials for the heavy tinning operation — bringing you great savings. Heat or acids do not affect Heanium. Available mounted or unmounted — rough cored or finished to size. They can be easily recut on standard die equipment in only a fraction of the time required by other materials bringing you further savings. Try them — order now. Heanium Wire Dies are manufactured exclusively by:

ROUX WIRE DIE WORKS, INC.
ORISKANY, N. Y., PH: UTICA 6-2373

facturers of equipment for the electric wire and cable industry, has announced the appointment of the **Paul I. Kenner Co.** 230 Shaw Road, South San Francisco, Cal., to serve as its western representative, according to advice received from **James L. Entwistle**, President.

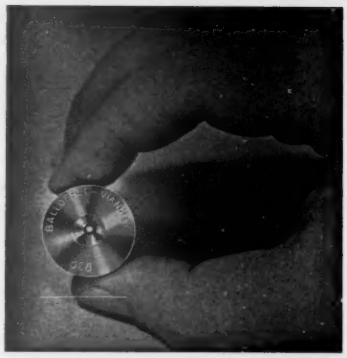
Associated Spring Announces Changes

Changes in the corporate staff of **Associated Spring Corporation** have been announced by **Carlyle F. Barnes**, president. Effective January 12 **E. L. Goff**, executive vice president became senior vice president; **W. E. Froehlich**, vice president—marketing and research and development, has been made vice president—engineering; and **F. E. Crist**, director of industrial relations, has become director of administration.

To Head Armco Research in Baltimore

F. T. Olt, Vice President of

BALLOFFET VIANNEY
WIRE DIE CO., Inc.



All sizes from .114" down to 0003" in stock from New York.

Manufacturers of
Quality diamond dies since 1870

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WIRE DIE CO., Inc.
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Tel: Union 3-3393

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WANT GOOD WIRE? THEN USE "THE BEST" DIES!

Only top-quality DIAMONDS are used by WAYNE. This, plus perfection in workmanship, is responsible for the fine reputation of

WAYNE WIRE DRAWING DIES

Satisfactory DIAMOND DIES can only be made by those who have experience, skill and knowledge. WAYNE has all of these. Users have called WAYNE DIES "the best."

WAYNE WIRE DIE CO.

200 Pennsylvania Ave., Hillside, N. J.
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TUNGSTEN CARBIDE WIRE DRAWING DIES
DESIGNED FOR LONG LIFE AND MAXIMUM WIRE PRODUCTION

Furnished semi-finished to within .001" to .002" of finished size at rough-drilled die prices. Require only light sizing and polishing before using. Our dies embody special design features that make for superior performance.

ALSO, A FULL LINE OF CARBIDE TOOLING FOR THE COLD HEADING INDUSTRY

EASTERN CARBIDE CORP.
NEW ROCHELLE, N. Y.

DIAMOND
and
TUNGSTEN CARBIDE
DIES
for all WIRE DRAWING purposes.
SPECIALISTS IN DIE REPAIR
WORK ON ALL TYPES OF DIES.
UNIVERSAL WIRE DIE CO.
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ELizabeth 2-2456

DIAMOND DIES .0006 - .120 DIAMOND POWDER
INDUSTRIAL
AJAX
SUPPLIES INC.
R.R. 4, P. O. Box 66, Fort Wayne, Ind.

NEW ENGLAND WIRE DIE CO.
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EXPERT RECUTTING
DIAMOND DIES, DIAMOND POWDERS
Eastern Representative of
Ajax Industrial Supplies, Inc.

DIAMOND DIES
PROFILED DIES
FINE SIZE DIES
VICTOR J. BOULIN INC.
10 FIRST STREET, PELHAM, N. Y.

DIAMOND POWDER
Diamond Reclaiming Services
FORT WAYNE DIAMOND PRODUCTS, Inc.
2623 E. Pontiac Fort Wayne 5, Indiana

Drawing Angle-Controlled
DIAMOND DIES
HOOSIER WIRE DIE, INC.
1730 Sinclair St., Ft. Wayne, Ind.

DIAMOND CARBIDE
DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

"Natdi"
REVERSIBLE DIAMOND DIES
NATIONAL
WIRE DIE CO. INC.
12 WEST 21st St. N.Y. 10, N.Y.

Armco Steel Corp., Middletown, Ohio, has announced the appointment of **F. Kenneth Bloom** as manager of the Research Laboratory at the Baltimore Works.

* * *

Mr. Bloom joined Rustless in 1935 as an assistant metallurgist after receiving a degree in chemistry from George Washington University. In 1939 he was named Research and Development Metallurgist and became Senior Metallurgist in 1943. He was appointed Assistant Director of the Baltimore laboratory in 1945, Supervising Metallurgist in 1947, and Research Metallurgist in 1951. He replaces **Dr. A. L. Feild**, who has retired.

* * *

Other appointments made were **M. E. Carruthers** as Director of Stainless Steel Research and **W. W. Marshall** as Supervising Research Metallurgist, both of Middletown.

New Representative for Surface Combustion

A. L. Hollinger, Vice President in Charge of Industrial Sales, **Surface Combustion Corporation**, Toledo, Ohio, has announced the appointment of **Robert J. Perry** as sales engineer in the Pittsburgh territory. He will handle the sale of Surface standard and special heat treat equipment from the district office at 4154 Library Rd., Pittsburgh 34.

* * *

He received his B.S. degree from Grove City College and has been engaged in similar work since 1948.

Canadian Cable Concern Announces Appointments

Triangle Conduit & Cable (Canada) Ltd., has appointed **R. A. Oldham** Chief Engineer and **A. D. Barraclough** as Manager, Technical Sales, according to an announcement by **J. W. Kerr**, President and General Manager.

* * *

Mr. Oldham, a graduate of The University of Toronto, joined Federal Wire & Cable in 1938 and held the posts of plant engineer,

DIAMOND DIES
.000's to .102"
For many years . . .
Outstanding in quality,
workmanship and service.
FORT WAYNE WIRE DIE, INC.
2625 E. Pontiac St., Fort Wayne, Ind.

DIAMOND WIRE DRAWING DIES
and DIAMOND POWDER
INDIANA WIRE DIE COMPANY
314-324 E. Wallace St., Fort Wayne, Indiana
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CARBIDE NAIL TOOLING
GRIPPERS — CUTTERS — FEEDERS
Finished — Milled & Brazed — Recut
PITTSBURGH CARBIDE DIE CO.
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DIAMOND DIES
mounted unmounted
For Precision Wire Drawing
BRENON, INC.
Experts in Fine Size Diamond Dies
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CARBIDE DIES • TOOLS • PARTS
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LINE—GORCY
mechanical
wire rod descalers
FISHER ASSOCIATES
122 East 42nd St. New York 17, N. Y.

ZINC WIRE
THE PLATT BROS. & CO.
Waterbury 20, CONN.

FINE WIRE 8-SPINDLE
TAKE-UPS
COLBOURNE
Machine Co., 21 Munro St.
Winsted, Conn.

METALLIZING WIRE
PURE ZINC
PURE CADMIUM
Other Fine Bare Wires
Manufactured to Your Specifications.
IMMEDIATE DELIVERIES
STAMFORD PROCESSING CO.
10-24 S. Water St., Peekskill, N. Y.

AJAX ELECTRIC SALT BATH FURNACES
for fast, economical heat treatment
AJAX ELECTRIC COMPANY
928 Frankford Ave., Philadelphia 23, Pa.

WORK WITH WEBB
for the finest quality
Stainless Spring Wire • Needle Wire
Carpenter Stainless No. 20 Wire
Available in round, square and rectangular shapes
WEBB WIRE
DIVISION OF THE CARPENTER STEEL COMPANY, NEW BRUNSWICK, N. J.

DAVIS ELECTRIC CO.
WALLINGFORD, CONN.
SPARKERS — TAKE-UPS
CAPSTANS — PAY-OFFS
SPOOLERS — TRAVERSES
TEFLON EXTRUDER

NEP · SUMFOAM
ACID INHIBITOR • PICKLING COMPOUND
THE PARKIN CHEMICAL CO.
HIGHLAND BLDG. PITTSBURGH 6, PA.

WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames — Take-Up Frame, Wire — Pointers — Puller Tongs — General and heat resisting alloy castings for wire mill use.
Circulars on Request
E. J. SCUDDER FOUNDRY & MACHINE CO.
TRENTON, N. J.

FINE WIRE RESPOOLING MACHINES
COLBOURNE
Machine Co., 21 Munro St.
Winsted, Conn.

Steel & Wire machinery co.
15457 EUCLID AVE. CLEVELAND 12, OHIO
EXCLUSIVE DISTRIBUTOR FOR FARMER NORTON WIRE DRAWING MACHINES

product technical engineer, and chief engineer. In 1956 he went to England to study European practices and worked for Crompton Parkinson's Derby Cable Works and Enfield Cables Ltd.

* * *

Mr. Barraclough joined Triangle 15 years ago and has held the positions of chief chemist and technical superintendent.

Norton Company Appointments

The Norton Company has announced the election of **Donald L. Price** as Vice President. He has occupied various sales positions for 38 years and was Sales Manager of the Abrasive Division, handling grinding wheels, at the time of his election.

* * *

Robert Cushman, Manager of Marketing Services since last January, succeeds Mr. Price, and **Harry G. Brustlin,** West Coast District Manager, has been brought to Worcester to take Mr. Cushman's place.

* * *

Sidney B. Wetherhead has been appointed Pacific Coast District Manager, with headquarters in Los Angeles. He was previously Manager of Distribution Sales Promotion, a post he had held since 1956.

Sheet and Tube Announces New Sales Assignments

Twelve new assignments have been announced in the sales department of **The Youngstown Sheet and Tube Company** by **M. H. Watkins,** vice president—sales.

* * *

Richard J. Stamberger, formerly assistant district sales manager in New York, becomes manager of the new Trade Relations Department.

* * *

Other appointments:

Robert W. Walling, Boardman, from assistant manager to manager of High Strength ("Yoloy") Sales, Youngstown.

Roy A. Curl, Boardman, from manager of Sales Promotion to manager of Sales Promotion and Advertising, Youngstown.

Robert B. Davidson, from Cleveland district sales office to assistant manager of "Yoloy" sales, Youngstown.

REELS
Wood, Plywood, Hardboard
8" to 72" in diameter
Durkee Manufacturing Co. Inc.
Pine River, Minnesota

WOOD REELS and SPOOLS
1" to 60" Diameters
American Woodworking Company
1674 N. LOWELL AVENUE
CHICAGO 39, ILLINOIS

HI-SPEED TAPING MACHINES
MULTI-TINNING TAKE-UPS
FINISH LINE TAKE-UPS
The finest that can be produced.
COLLINS BROS. MACHINE CO.
(Est. 1866)
WIRE & CABLE MACHY. DIV.
647 ROOSEVELT AVE., PAWTUCKET, R. I.

For conformance with MIL-C-12064A (CE)
SCOTT MODEL E
"For Cable, Power, Electric, 600-volt, for field use the (insulation) brittleness shall be evaluated by the solenoid operated American Cyanamid tester." This specification pinpoints the applicability of the Scott Model E Brittleness Tester for this test.
SCOTT TESTERS INC. 55 BLACKSTONE ST. PROVIDENCE 1, R.I.

DEPENDABLE WIRE EQUIPMENT
FINE WIRE DRAWING MACHINES
RESPOOLING MACHINES
WIRE PLATING EQUIPMENT
SCREW TYPE TRAVERSES
HODGE BROS. MACHINE SHOP
2 HAVELL ST. • OSSINING, N. Y.

WORLD'S LARGEST MANUFACTURER
SPIRAL WRAPPING MACHINES
For Coils or Straight Lengths
Terkelsen Machine Company
323 A Street, Boston 10

Immediately Available
WIRE WORKING MACHINERY
FOURSLIDES: Baird, Nilson & Manville, Nos. 0, 1, 2, 3, 4, 5, 3-20, 4-26
U. S. Tool Co. No. 22, 28, & 33 Multislides
Sleeper & Hartley Spring Coilers Nos. 0, 1, 2, 3, 3½, 4, & 5 & Torrington W10 & W12
Vaughn Nos. 8, 10, & 12 Moto-Blocs
Waterbury No. 3 Bull Blocks, Duplex
Morgan 4 stand Wire Drawer with pointer and 100 H.P. motor drive & motor
Waterbury Nos. 1, 2, & 3 Continuous Wire Drawing Machines
PARTIAL STOCK LISTING
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★ ★ ★

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★ ★ ★

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★ ★ ★

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★ ★ ★

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★ ★ ★

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Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Company, Harrison, N. J.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.

MACHINERY—Bobbin Winders
Hanson & Edwards, Ltd., Warrington, England
Larmuth and Bulmer, Limited, Manchester, England

MACHINERY—Bolt, Rivet, Screw, etc.
Behr Machinery & Equipment Corp., Rockford, Ill.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Braiding
New England Butt Co., Providence, R. I., Division of Wanskuck Co.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Link Fence
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Steel & Wire Machinery Co., Cleveland, Ohio

MACHINERY—Chain Making
Larmuth and Bulmer, Limited, Manchester, England
Steel & Wire Machinery Co., Cleveland, Ohio

MACHINERY—Closing Rope
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Larmuth and Bulmer, Limited, Manchester, England
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Cold Heading
Behr Machinery & Equipment Corp., Rockford, Ill.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Herborn, Maschinenfabrik, Herborn, Germany
Morgardshammars Mek Verkstads A. B., Morgardshammar, Sweden.
National Mach'y Exch (Used), New York
Steel & Wire Machinery Co., Cleveland, Ohio
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Dead Block (Stationary Coiler)
Morgan Construction Company, Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Maschinenfabrik, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Metallurgical Products Dept. of General Electric Co., Detroit
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Davis Electric Co., Wallingford, Conn.

Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

MACHINERY—Extruding

Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence

Glader, Wm., Machine Works, Chicago, Ill.
Norton & Co., Ltd., Sir James Farmer, Manchester, England

MACHINERY—Flat Wire

Mettler Machine Tool, Inc., New Haven, Conn.
Steel Equipment Company, Cleveland, Ohio
Steel & Wire Machinery Co., Cleveland, Ohio
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire

Steel & Wire Machinery Co., Cleveland, Ohio
Takemura Co., Ltd., New York, N. Y.

MACHINERY—Galvanizing Wire

Ofenbau Fritz G.m.b.H. & Co. K. G. Hagen, (W.-Germany)
Steel & Wire Machinery Co., Cleveland, Ohio
Takemura Co., Ltd., New York, N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Whitacre Engineering & Manufacturing Company, Alhambra, California
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders

Entwistle Manufacturing Corporation, Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding

Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire

American Insulating Mach'y Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulation Testing (See MACHINERY—Spark Testing)

MACHINERY—Lacquering Electric Wire

American Insulating Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer

Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Material Handling

(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable

Davis Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wisc.
Enjaco Corporation, Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack

Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Takemura Co., Ltd., New York, N. Y.

MACHINERY—Packaging Wire

Coulter & McKenzie Machine Co., Bridgeport, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Patenting Wire

Ofenbau Fritz G.m.b.H. & Co. K. G. Hagen, (W.-Germany)
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Plating

Bartell Machine Tool Corp., Rome, N. Y.
Hodge Bros. Machine Shop, Ossining, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing

Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Printing on Electric Wire

Enjaco Corporation, Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M. Co., Inc., West Boylston, Mass.

MACHINERY—Re-Spooling

Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill

Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill

Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Rubber Insulating

Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving

Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Slitting Mills

Steel Equipment Company, Cleveland, Ohio

MACHINERY—Spark Testing

Davis Electric Co., Wallingford, Conn.
Enjaco Corporation, Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Peschel Electronics, Inc., Towners, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spooling Tension Controls

Web Controls Corp., West Englewood, N. J.

MACHINERY—Spring Making

National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Straightening & Cutting

American Laubscher Corporation, New York 19, N. Y.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Pan American Supply Company, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel & Wire Machinery Co., Cleveland, Ohio
Takemura Co., Ltd., New York, N. Y.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Stranding

Bartell Machine Tool Corp., Rome, N. Y.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Larmuth & Bulmer Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Düsseldorf-Rath, Germany
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging

Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out

American Insulating Mach'y Co., Phila., Pa.
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Collins Bros. Machine Co., Wire & Cable Machy. Div., Pawtucket, R. I.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Enjaco Corporation, Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Kraft, J. A., Maschinenfabrik, OLPE/Westf. Germany
Larmuth & Bulmer Limited, Manchester, England
Litzler, C. A., Co., Inc., Cleveland, Ohio
Northern Indiana Steel Supply Co., Inc., Michigan City, Indiana
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Taping

American Insulating Mach'y Co., Phila., Pa.
Collins Bros. Machine Co., Wire & Cable Machy. Div., Pawtucket, R. I.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing for Dielectric Faults

Peschel Electronics, Inc., Towners, N. Y.

MACHINERY—Testing, Physical

Scott Testers, Inc., Providence, R. I.

MACHINERY—Thread Rolling

Mettler Machine Tool, Inc., New Haven, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Tinning Wire

American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Ofenbau Fritz G.m.b.H. & Co. K. G. Hagen, (W.-Germany)
Syncro Machine Co., Perth Amboy, N. J.
Takemura Co., Ltd., New York, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Tinsel Rolling Mills

American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire

Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing

Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning

(See Mach.—Bunching)

MACHINERY—Twisters, Wire

Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used

National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh

National Electric Welding Machines Co., Bay City, Michigan
Schlatter, Ltd., H. A., Zollikon/Zurich

MACHINERY—for Wire Welding

(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire

Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Esmond, R. I.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.

Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Laubscher Corporation, New York 19, N. Y.
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Morgan Construction Co., Worcester, Mass.
Morgardshammars Mek Verkstads AB, Morgardshammar, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Wire and Machinery Co., Cleveland, Ohio
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Takemura Co., Ltd., New York, N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Wire Forming
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Takemura Co., Ltd., New York, N. Y.

MACHINERY—Wire Rope
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Company, Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A.C. — D.C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Central Tool and Machine Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Company, Winsted, Conn.
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAINT BONDING CHEMICALS—
Amchem Products, Inc., Ambler, Pa.

PAINTS—Heat Resisting
Amchem Products, Inc., Ambler, Pa.

PAPER—Creped Wrapping
Ludlow Papers, Inc., Needham Heights, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Ludlow Papers, Inc., Needham Heights, Mass.

PAPER—Insulating
Ludlow Papers, Inc., Needham Heights, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Cary Chemicals, Inc., New Brunswick, N. J.
Celanese Corporation of America, New York, N. Y.
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.

PLASTICS—for Wire Insulation
Apex Tire & Rubber Co., Pawtucket, R. I.
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
Celanese Corporation of America, New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
Thompson Chemical Company, Pawtucket, R. I.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation. New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

PRINTING WHEELS—for Electric Wire
Frank Daniels & Co., New York, N. Y.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Co., Inc., West Hanover, Mass.
Gillies, Duncan M. Co., Inc., West Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Mettler Machine Tool, Inc., New Haven, Conn.
Northern Indiana Steel Supply Co., Inc., Michigan City, Indiana
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Seymour & Peck Div., The Greif Bros. Cooperage Corp., Chicago, Ill.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New York Engineering Corp., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Steel, for Rope and Cable
New York Engineering Corp., Yonkers, N. Y.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Boonton Molding Company, Boonton, N. J.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Molded Fiber Glass Tray Co., Linesville, Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Seymour & Peck Div., The Greif Bros. Cooperage Corp., Chicago, Ill.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Seymour & Peck Div., The Greif Bros. Cooperage Corp., Chicago, Ill.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Aluminum Company of America, Pittsburgh, Pa.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Niederrheinische Huette, A. G., Duisburg, Germany
Pittsburgh Steel Co., Pittsburgh, Pa.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—Plastic
Boonton Molding Company, Boonton, N. J.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Molded Fiber Glass Tray Co., Linesville, Pa.
Plastic Mold & Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TANKS—Ceramic, for Galvanizing
Ofenbau Fritz G.m.b.H. & Co. K. G. Hagen, (W.-Germany)

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

WHERE TO BUY, Continued

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Hodge Bros. Machine Shop, Ossining, N. Y.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila, Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

WAXES—for Insulated Wire
Cary Chemicals, Inc., New Brunswick, N. J.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.
National Electric Welding Machines Co., Bay City, Michigan
H. A. Schlatter, Ltd., Zollikon-Zurich

WHEELS—for Printing on Electric Wire
Frank Daniels & Co., New York, N. Y.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

WIRE—Aluminum
Aluminum Company of America, Pittsburgh, Pa.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Malin & Co., The, Cleveland, Ohio
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Clad and Plated
Sylvania Electric Products Inc., Warren, Pennsylvania

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Malin & Co., The, Cleveland, Ohio
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
Aluminum Company of America, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat
Montgomery Co., The, Windsor Locks, Conn.
National Standard Company, Niles, Mich.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
Aluminum Company of America, Pittsburgh, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corporation, Pressed Steel Div., Cleveland, Ohio
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Malin & Co., The, Cleveland, Ohio
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Malin & Co., The, Cleveland, Ohio
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Special Shapes
Continental Steel Corp., Kokomo, Ind.
National Lock Washer Company, The, Newark, N. J.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Roebling's John A., Sons Corp., Trenton, N. J.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Malin & Co., The, Cleveland, Ohio
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Roebling's, John A., Sons Corp., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

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ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

SERVICE ENTRANCE CABLE MACHINES

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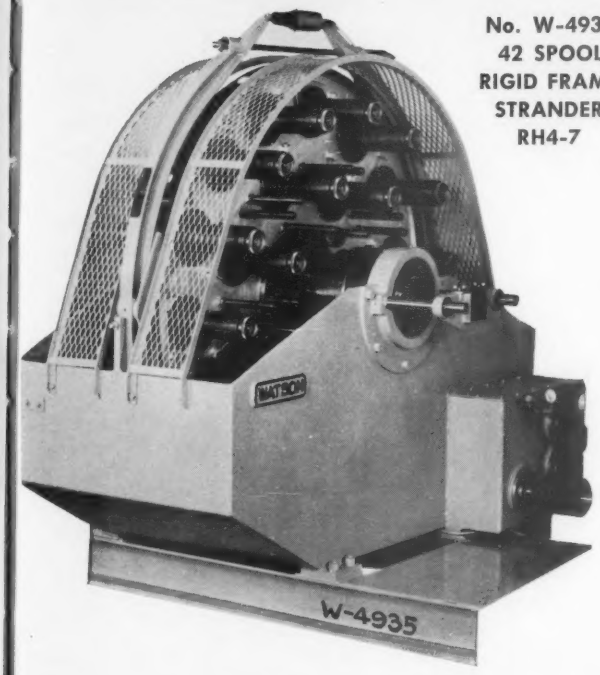
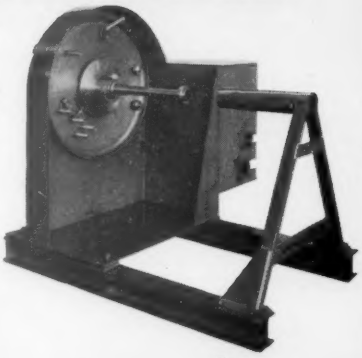
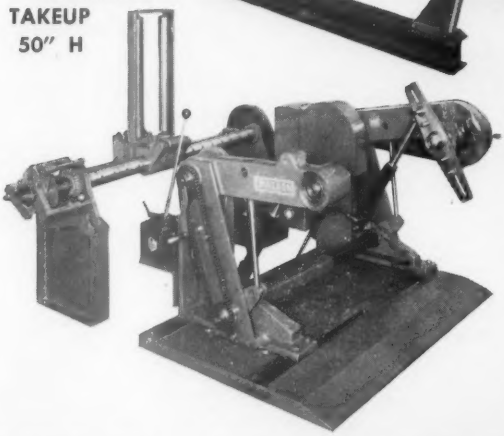
No. W-4935
42 SPOOL
RIGID FRAME
STRANDER
RH4-7



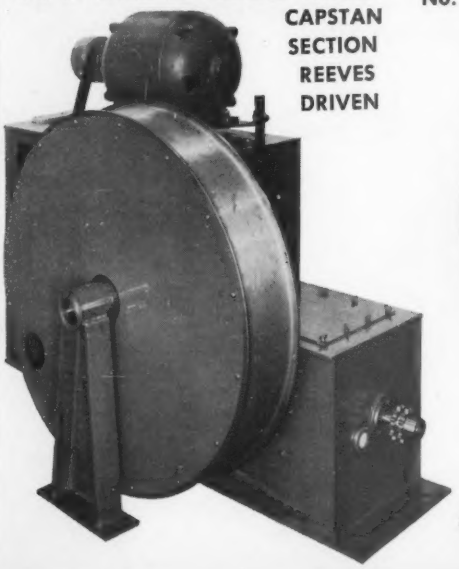
No. W-4712
SINGLE
CONCENTRIC
TAPER
20" SC-BT



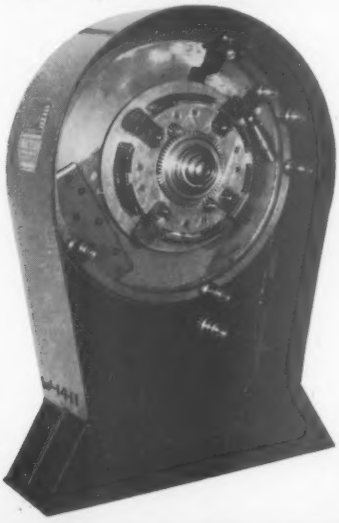
No. W-3652
HYDRAULIC LIFT
"SHAFTLESS"
TAKEUP
50" H



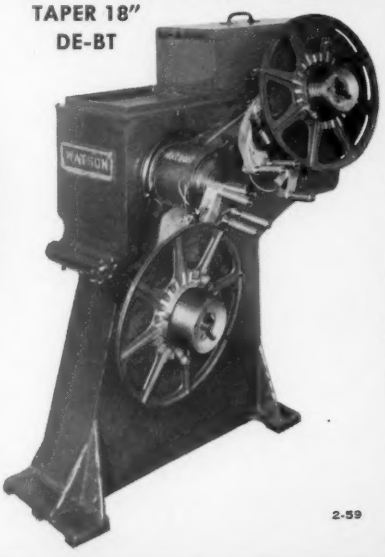
No. W-4390b 36" SINGLE WHEEL
CAPSTAN
SECTION
REEVES
DRIVEN



No. W-1411 SINGLE CONCENTRIC
STEEL TAPER 19" SC-BT



No. W-4408 DOUBLE ECCENTRIC
TAPER 18"
DE-BT



2-59

Syncro Designs and manufactures the following quality machinery:

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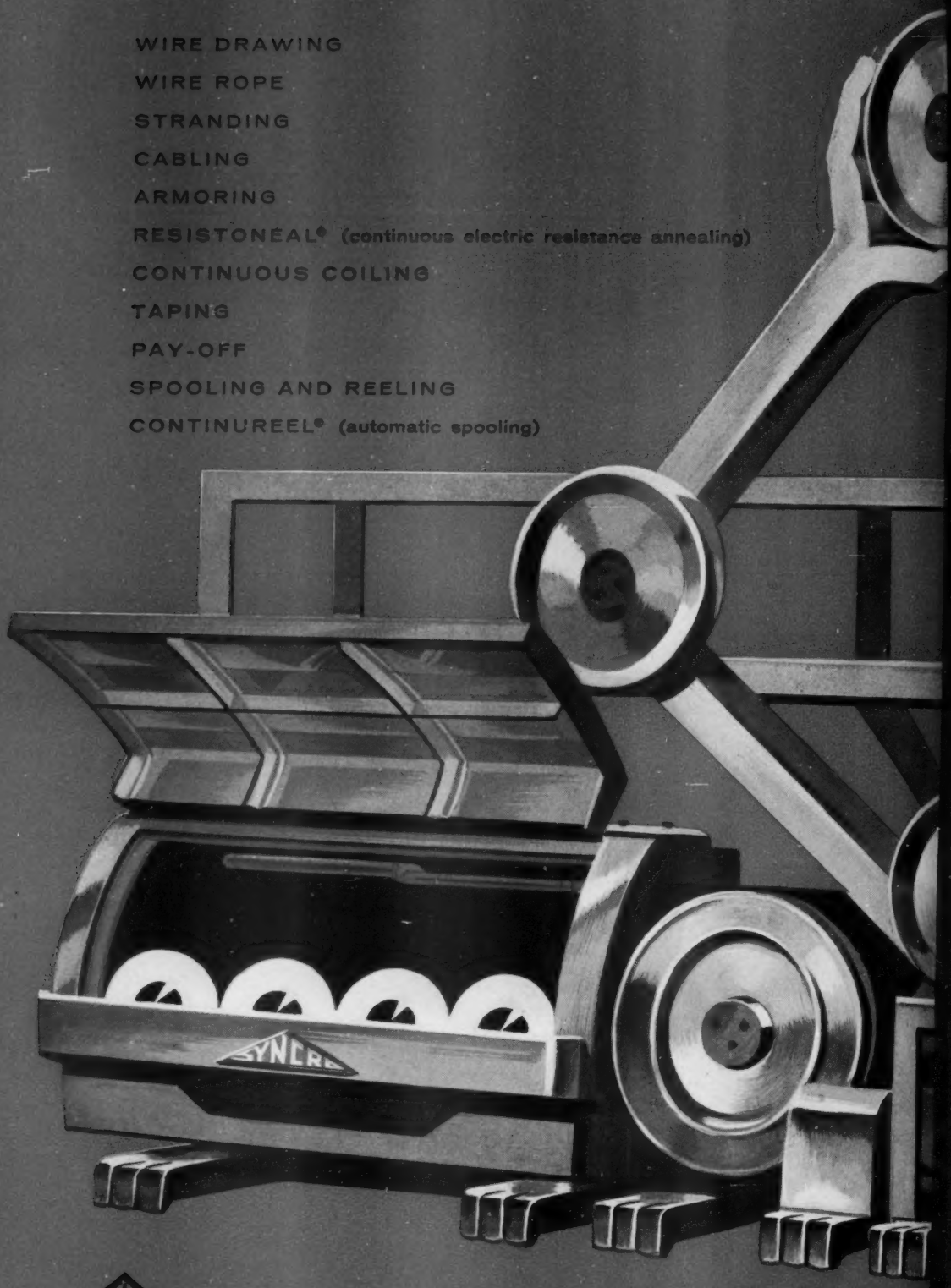
WIRE ROPE
STRANDING
CABLING
ARMORING
RESISTONEAL® (continuous electric resistance annealing)
CONTINUOUS COILING
TAPING
PAY-OFF
SPOOLING AND REELING
CONTINUREEL® (automatic spooling)



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